LABOR FORCE PARTICIPATION

AND

INDUSTRIAL STRUCTURE:

A CROSS-SECTIONAL ANALYSIS

THE OLD WEST REGIONAL COMMISSION
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Prepared For

The Old West Regional Commission

by

Arizona State University

FOREWORD

This report concerns an investigation sponsored jointly by the Old West and Four Corners Regional Commissions. The Commission is indebted to all those who participated in the project.

Warren C. Wood

The Old West Region Commission is a Federal-State partnership designed to solve regional economic problems and stimulate orderly economic growth in the states of Montana, Nebraska, North Dakota, South Dakota and Wyoming. Established in 1972 under the Public Works and Economic Development Act of 1965, it is one of seven identical Commissions throughout the country engaged in formulating and carrying out coordinated action plans for regional economic development.

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Principal Findings

The purpose of this study was to investigate the relationships between county-level labor force participation behavior of alternative sex-age cohorts and a number of theoretically plausible economic and/or demographic characteristics of the counties encompassed by the Four Corners and Old West Regional Commissions. Considerable emphasis was placed on the influence of the industrial composition of employment as a key determinant of participation behavior. The principal findings of this investigation are as follows:

(1) County-specific economic and demographic characteristics exert important influences on the labor force participation behavior of a large number of the sex-age cohorts analyzed.

(2) Industry-specific relative employment opportunities for a particular sex importantly influence the labor force participation behavior of many of the age groups of that sex. Moreover, the industrial distribution of these relative employment opportunities exerts quite different effects on the labor force participation rates recorded for males and females.

(3) The predictive power of the labor force participation equations estimated was generally greatest for "large" counties and least for the "small" counties analyzed. This general pattern was found in the equations estimated for workers of either sex.

(4) The overall relationship between industry-specific relative employment opportunities and the labor force participation rates of women was estimated to be approximately the same in "large," "intermediate,"

and "small," counties. In contrast, this expected positive relationship between employment opportunities and participation rates was most pronounced for males in the "intermediate" county size group and less pronounced for males in the other two county size groups.

(5) The relationship between industry-specific relative employment opportunities and labor force participation behavior was most pronounced for "prime-aged" females, compared with other female age cohorts. In contrast, no concentration of this relationship by age cohort was found in the equations estimated for males.

(6) Little "hidden" unemployment apparently existed in the nine-state region in 1970. A negative and statistically significant regression coefficient for the unemployment rate variable was found in only one of the 54 equations estimated. This result, however, may be partly due to the fact that hidden unemployment is generally considered to be most relevant during periods of slack economic activity, whereas a relatively high level of economic activity existed throughout the region in 1970. Also, the nonsignificance of the unemployment rate coefficients may reflect the inclusion of other measures of economic activity in the equations--the industry-specific relative employment opportunities for workers of a particular sex.

(7) Counties with high percentages of either married women with husbands present or of a particular male age cohort enrolled in school tended to have lower labor force participation rates recorded for the relevant cohorts than in counties with otherwise similar characteristics. The relationship between female school enrollments and labor force participation, however, was not pronounced.

(8) For particular sex-age cohorts, certain other theoretically relevant determinants of labor force participation behavior--for example, the ethnic composition of the county population or median county earnings--were also found to be importantly related to participation rates.

Recommendations

This investigation was designed as a demonstration project to model a limited number of the determinants of county-level labor supply responses. Additional dimensions of labor supply behavior are worthy of study and could be usefully integrated with the results of this analysis. Within this context, the following recommendations for utilization of the present findings and extensions of the analysis are suggested:

(1) The labor force participation equations developed in the present study should be integrated into the simulation model framework in those states within the nine-state region engaged in modeling activities.

(2) Efforts should be undertaken to link other aspects of labor supply responses--specifically migration flows--to labor force participation behavior.

(3) Additional research is warranted in the areas of "under-employment" or "sub-employment" to reflect the full-time equivalent labor efforts of the total labor force. No such distinction could be made in this study.

(4) The extent of sex or age substitutability in labor force participation responses to a given level or changes in relative employment opportunities should be investigated. The present study analyzed a total of 18 sex-age cohort groups for each of three county-size categories. Employment opportunities for a particular sex-age cohort group may be importantly influenced by opportunities of other sex-age groups.

(5) Industrial developers within the region may wish to compute the labor force participation responses (by sex and age) to a particular pattern of planned economic expansion within a specific county or group of counties. The estimated regression coefficients for the relative EOI variables contained in the 54 equations would allow such rough calculations of labor supply responses. An example that may clarify the way in which the results of this study can be utilized for regional planning and industrial development is included in Appendix F of this report.

LABOR FORCE PARTICIPATION AND INDUSTRIAL STRUCTURE: A CROSS-SECTIONAL ANALYSIS*

The responsiveness of labor force size and composition to changes in the demographic characteristics of the population and/or changes in economic activity levels are important considerations in regional planning. Estimation of the direction and magnitude of these responses provides regional and industrial planners with useful information about the impact of alternative scenarios of industrial expansion on the level and composition of both employment and unemployment within the region. The extent to which the labor force size and composition varies as economic activity levels change is important information in formulating appropriate regional policies, and in estimating the number of new jobs which must be created to provide for conditions of "full" employment within a region. The nature of the labor force response to variations in the industrial composition of employment and/or the unemployment rate is conditioned by a number of factors. An increased production level within a region, for example, could result in additional multiple job holding or increased hours of work (including overtime) among the employed component of the labor force; in this instance, the economic expansion would have little impact on unemployment rates or levels. In the absence of these types of responses, however, and given constant labor productivity, increased production would provide additional employment opportunities for unemployed workers, new labor force entrants (or reentrants) and/or persons who have migrated from other areas. Migration responses are generally long-run in nature, however, and are not included within the scope of this study.

The emphasis here is on the determinants of labor force participation rates, with special emphasis on the impact of employment opportunities in specific industries on labor force participation decisions.

Efforts already are underway to incorporate the results of the study into some of the regional planning models currently available in a number of states encompassed by the Four Corners and Old West Regional Commissions;[1] at present these models assume fixed labor force participation rates which are invariant to alternative patterns, levels and rates of economic growth within each state. These models, however, currently do provide for endogenous migration responses to variations in economic activity levels. Hence, integration of the results of this study into these models will allow the simulations to reflect both types of labor supply responses to changes in economic activity levels. At a more general level, the results of this study hopefully will be of broad interest to those interested in regional problems and development throughout the nine states. Industrial developers and regional planners may find especially useful the implications of the equations estimated for the existence (or absence) of a labor force "reserve" available to fill new job openings in particular industries.

Data and Methods

This investigation is based on county-specific observations within the nine-state region obtained from the 1970 Census of Population. The phenomena to be "explained" in the statistical analysis are the inter-county variations in the labor force participation rates of 18 cohort groups, disaggregated by age and sex.[2] It should be emphasized that the county-specific values of the labor force participation rates for these cohort groups measure only one specific aspect of labor supply, which is subject to the definitions of "employment" and "unemployment" utilized for census tabulations.[3] A person is included in the employed component of the labor force if work for as little as one hour for pay or profit is recorded, or if a larger number of hours are worked for no pay in a family enterprise. If less than this amount of labor force activity occurred during the reference week, the individual is not included as a part of the employed labor force. Work above the minimums described above results in no change in the employment status recorded for an individual in the census; an individual either fulfills the minimum criteria for employment or he does not. No adjustments in labor force status for part-time employment or for "sub-employment" are possible. In addition, it is not possible to directly determine the amount of "under employment" (individuals working, but at jobs below their skill and productivity levels) from the census data.

To be considered as part of the unemployed component of the labor force, an individual must be without work and must have engaged in job search activities during some reference period. Persons not fulfilling these criteria are considered to be "out" of the labor force. Unfortun-

ately, information about why these individuals are currently out of the labor force is not available from the county census data. Hence, it is not possible to assess the amount of non-market production undertaken by some workers (e.g., housewives) or to assess the amount of total output (both market and nonmarket) loss, if any, associated with nonparticipation in the labor force.

The nine-state region contains a total of 431 counties. Labor force participation rates for each of the 18 sex-age cohort groups analyzed were not reported for a number of these counties, however, because too few persons were in one or more of these cohort groups in the county during the survey week in 1970. The counties for which one or more of these rates were unavailable were eliminated from the data base for this study. This procedure allowed for more meaningful comparisons among the equations estimated for the different cohort groups, and generally facilitated the empirical analysis. The final set of counties upon which the analysis is based totals 319.

Separate analysis of the 18 sex-age cohort groups was undertaken because of the expected heterogeneity of labor force responses among these groups to changes in the composition and/or level of economic activity. Similarly, it seems likely that labor supply responses to changes in employment opportunities could differ substantially between small rural counties and large metropolitan areas, and that such differences are too complex to be accounted for simply by including an urbanization variable in the model. Thus, the observations also were disaggregated into alternative county-size groups. On the basis of considerable preliminary experimentation and analysis, labor force participation

equations for each of the 18 sex-age cohorts were separately estimated for three county-size categories, identified on the basis of urbanization levels: 1) small counties are defined as those containing no urban places with a population size of 2500 or more persons during the reference period in 1970; 2) intermediate counties are defined as those containing at least one urban place with a population size of at least 2500 or more persons but no urban places of population size 10,000 persons or more in 1970; and 3) large counties are defined as those containing one or more urban places with a population size of 10,000 or more persons in 1970.[4] With 18 sex-age cohort groups to be considered within each of the three county size categories, a total of 54 equations were estimated for each of the alternative specifications of the statistical model investigated for this study.

Empirical studies of labor force participation decisions are generally based on two distinct types of data: 1) time series data, which measure directly the intertemporal movements of the participation rates of distinct population subgroups; and 2) cross-section data, which provide only indirect evidence of such intertemporal movements. The present investigation is based on county-specific observations of the latter type. Hence, a fundamental assumption of this analysis is that the equations estimated with these cross-sectional data at a point in time are useful in assessing the responsiveness of labor force participation decisions to changes in the variables included in the analysis through time. For example, it is assumed that the estimated impact of a 1 percent difference in the industrial composition of employment across counties in 1970 provides a good approximation of the impact on labor

force participation rates of a 1 percent change in the industrial composition of employment in a given county (or group of counties) through time. This methodological point is especially relevant to the extent to which the equations developed in this report are integrated into the state-wide planning models. As much of the consumption function (and other econometric) literature has noted in recent years, the assumptions involved in utilizing coefficients estimated from cross-sectional studies within a time series mode of analysis are generally quite strong, and on occasion may produce some errors in estimation.[5] The time series data required for an analysis comparable to the present study, however, are not available.[6]

Conceptual Framework

Individual labor force participation decisions are generally conditioned by joint "household" choices which affect the allocation of each member's time among alternative uses. These uses include labor market participation, nonmarket production (e.g., sewing for family members, home gardening, etc.), schooling and/or training, and leisure time. Allocation of time to these activities is affected by a set of household "taste" variables (for money income, market work, schooling, leisure, etc.), expected employment opportunities, market earnings and other relevant dimensions of potential employment options, expected productivity in the nonmarket sector, and the current and desired levels of family assets. The present investigation is based on county-wide aggregates of individual observations, but the implications of this general

conceptual framework obviously provide the basis for an assessment of the expected relationships between the variables analyzed and labor force participation rates. Within this context, medians and percentage distributions replace the actual values of specific variables that would be used if observations on specific individuals were analyzed.

The following sets of "explanatory" variables were selected from the county census data as potentially relevant determinants of inter-county variations in labor force participation rates: 1) the industrial distribution of employment; 2) the level of economic activity; 3) the ethnic composition of the population; 4) the extent of urbanization; 5) earnings levels; 6) educational attainment and school enrollment; 7) family status; and 8) geographic area within the region.[7] The general form of the model estimated for the 18 sex-age cohort groups is:

$$\text{(1)}\quad LFPR_{ijk} = f(ICE_{igk}, EIN_{gk}, POP_{ik}, UNE_k, ETH_{ik}, URB_k, EARN_{ik}, EDUC_{ik}, FAM_{ik}, REG_k)$$

where: $LFPR_{ijk}$ = the labor force participation rate of the i^{th} sex, j^{th} age group and the k^{th} county.

ICE_{igk} = a measure of employment of the i^{th} sex in industry g in the k^{th} county.

EIN_{gk} = the total level of employment in industry g in the k^{th} county.

POP_{ik} = the number of work-age persons of the i^{th} sex in the k^{th} county.

UNE_k = the overall unemployment rate in county k (not seasonally adjusted).

ETH_{ik} = a set of variables to measure the ethnic composition of the i^{th} sex in the k^{th} county.

URB_k = a set of variables to measure the extent of urbanization in the k^{th} county.

$EARN_{ik}$ = a measure of the earnings levels of persons of the i^{th} sex in the k^{th} county.

$EDUC_{ik}$ = a set of variables to measure the educational attainment level in the k^{th} county, and to measure the proportions of certain cohort groups enrolled in school.

FAM_{ik} = an index of marital status of the female cohorts in the k^{th} county.

REG_k = a set of dummy variables to measure the influence on labor force participation rates of the individual state (or combination of states) within which the k^{th} county is located.

The relationship between these variables and labor force participation rates are discussed below.

Industrial Composition of Employment

The industrial composition of employment is expected to exert an important influence on the labor force participation choices of persons in each of the cohort groups analyzed, and this set of variables is emphasized in this study. Bowen and Finegan consistently employed an "industry mix" variable to capture the influence of sex-specific employment opportunities on labor force participation decisions across the 100 largest SMSA's in 1960.[8] More recently, Blair constructed an employment opportunities index based upon the industrial structure of employment in his analysis of labor force participation behavior for county census divisions

in Utah in 1970.[9] The approach taken in this investigation draws heavily on the techniques developed in these earlier studies.

An important dimension of the impact of the industrial composition of employment on labor force participation rates is the extent to which different industries provide different absolute levels of employment opportunities for workers of a particular sex. The magnitude of this impact depends on two factors: 1) the percentage of employment in each industry accounted for by men or women (the sex-ratio of employment); and 2) the total level of employment in each industry (the 10 industrial categories used in this study are defined in Appendix B). On the assumption that the sex ratio of employment by industry does not change over time,[10] a proxy for the expected absolute level of sex-specific employment opportunities within a given industry at a point in time would be equal to the observed 1970 sex ratio of employment in that industry multiplied by the absolute level of employment in that industry.[11] For example, if 90 percent of the employment in agriculture is accounted for by males in 1970 and 10,000 persons are employed in this industry at some subsequent point in time, expected absolute employment opportunities for males in this industry would be 9,000. The level of absolute employment opportunities for workers of a given sex in a specific industry does not, however, account for the number of persons of that sex of labor force age who are potentially available to fill these jobs, a factor which also should importantly influence labor force participation decisions. Thus, the variables constructed for this study to reflect these influences consist of a set of relative sex-industry employment opportunity indexes. These indexes were constructed by dividing the absolute number of employ-

ment opportunities for workers of a given sex in a specific industry by the total number of persons of that sex of labor force age; if the relevant population of males of labor force age equals 100,000, then the relative sex-industry employment opportunity index for males in agriculture (given the example used above) would be 9,000/100,000 = .09. This ratio simply indicates that jobs in the agricultural sector are expected to provide enough employment to account for 9 percent of all males potentially available to fill those jobs.

One problem which arises in estimating the sex-specific employment opportunities for each industry (an <u>independent</u> variable in the regression analysis) is that the county-specific values of the sex-employment ratio for each industry may depend, at least in part, on the values of the sex-specific labor force participation rates (the <u>dependent</u> variable) observed in the <u>same county</u>. Because of the potential problems which such simultaneity could produce, it was concluded that <u>county-specific</u> observations for the sex ratio of employment by industry would <u>not</u> be utilized in this analysis. Instead, region-wide values of the sex ratio of employment were computed (for the counties included in a specific county-size category), one for each of the ten industry classifications (e.g., male employment in agriculture in <u>all</u> counties included in the county-size group divided by the total employment in agriculture in these same counties). Because three county-size groups were analyzed, a total of 30 of these region-wide sex ratios of employment was constructed for each sex, one set of 10 (for the 10 industrial categories) for each of the three county size groups; the values of these industry sex ratios are found in Appendix C. To estimate the absolute level of employment

opportunities provided by each industry for the workers of either sex in a particular county, the region-wide sex ratio of employment for each industry was multiplied by the absolute level of employment in that industry and county. For a particular industry, this product thus indicates the absolute number of jobs that would be expected to be available to the members of a particular sex in a given county, if the sex-employment opportunities within that county depended only on the region-wide sex-employment ratios for that industry and the observed level of employment in that industry within the county. As noted above, however, the relative (not absolute) levels of employment opportunities likely are more relevant for labor force participation decisions. Hence, each of the absolute employment opportunity indexes for each industry was divided by the total number of persons of that sex of labor force age within the county, to create a set of relative sex-specific employment opportunity indexes (EOI).

Given the complexity of the construction of these industry EOI variables, an example may clarify the specification of this set of variables. These variables for the male cohorts in large counties were specified as:

$$(2) \qquad \left[\frac{E_{m1}}{E_1}\right]_L \cdot \left[\frac{E_{1k}}{POP_{mk}}\right], \left[\frac{E_{m2}}{E_2}\right]_L \cdot \left[\frac{E_{2k}}{POP_{mk}}\right],$$

$$\left[\frac{E_{m3}}{E_3}\right]_L \cdot \left[\frac{E_{3k}}{POP_{mk}}\right], \ldots, \left[\frac{E_{m10}}{E_{10}}\right]_L \cdot \left[\frac{E_{10k}}{POP_{mk}}\right], \quad \text{where:}$$

$\left[\frac{E_{m1}}{E_1}\right]_L$, $\left[\frac{E_{m2}}{E_2}\right]_L$, ... $\left[\frac{E_{m10}}{E_{10}}\right]_L$ denotes total employment of males in the (large county group) region in industries 1, 2, . . . 10, respectively, divided by total employment in the (large county group) region in industries 1, 2, . . . 10, respectively.

E_{1k}, E_{2k}, ... E_{10k} denotes the level of total employment in industries 1, 2, . . . 10 in county k, respectively.

POP_{mk} denotes the total number of work-age males residing in county k.

An important feature of this specification is that even though the values of the dependent variable are both sex and age specific, the industrial composition of employment variables, and the population variable are sex specific. This specification reflects the judgment that a substantial amount of substitution may occur among employment opportunities for the various age groups of the same sex.[12] Each of the 10 EOI variables is expected to be positively related to the labor force participation rates of each of the cohort groups analyzed because higher levels of sex-specific employment opportunities in a particular industry, *ceteris paribus*, generally would be expected to induce additional labor force entry by persons in a particular cohort group. It should be noted, however, that female cohorts are likely to be more responsive to variations in these variables than male cohorts, especially the prime-age male groups.

Unemployment Rate and "Hidden" Unemployment

Another important determinant of labor force participation is the overall level of economic activity within the county. In fact, cyclical variations in labor force participation rates have attracted considerable attention for many years. On the one hand, a rise in the unemployment rate may create real-income pressures on the families of the unemployed, and this may induce some family members to (temporally) enter the labor force; persons attracted into the labor force in this way are denoted as "additional" workers. On the other hand, the decline in economic activity mirrored by the rise in the unemployment rate reduces the probability of obtaining employment per period of job search, and this may cause some workers to terminate active job search. Such workers are not included in the official labor force measures because active job search is required for an individual to be counted as unemployed. Persons who terminate job search activities because of slack economic conditions are denoted as "discouraged" workers. Because of these two conflicting effects on labor force participation of a change in economic activity levels, any net changes in labor force size attributed to a rise in the unemployment rate would depend on the relative strengths of these two tendencies. Most of the empirical studies of these relationships have revealed that labor force size (and hence labor force participation) varies inversely with the overall rate of unemployment.[13] The potential existence of (net) "hidden" unemployment when the economy is operating below "full" employment has significant implications for national policies, and also is of interest at the state or regional level. Increased levels of economic activity may result in an automatic increase in the size of a region's

labor force. Conversely, a depressed level of economic activity may hide the "true" nature and extent of regional unemployment problems because of the omission of (net) discouraged workers from the official unemployment statistics.

Interpretation of the results of studies related to the existence and incidence of "hidden" unemployment must be cautiously undertaken. An important issue, for example, is whether the "hidden" unemployed should be directly added to the persons "officially" unemployed to determine the "total" amount of unemployment in a region. Such a procedure is probably not appropriate, and some qualifications should be noted. The "measured" and "hidden" components of unemployment are not defined by the same criteria. Individuals counted as a part of "measured" unemployment are actively seeking work and presumably are willing to accept employment commensurate with their skill levels under <u>prevailing</u> labor market conditions and wage rates. In contrast, persons estimated to comprise the ranks of the "hidden" unemployed would be willing to search for (and presumably be willing to accept) employment offers consistent with their skill levels only under <u>improved</u> labor market conditions. Hence, the additivity of the "measured" and "hidden" components of "total" unemployment involves some severe conceptual difficulties on this point alone. In addition, it should be noted that the nature of the opportunity costs incurred by members of these two unemployed groups while engaged in labor force activities may differ substantially. As Mincer has emphasized, additivity of the two types of unemployment would imply that market production would increase proportionately through a reduction in either type of unemployment, and that the net marginal products

of persons in the two groups are equal when both groups are employed and are zero when they are unemployed.[14] Nonetheless, it is also important to emphasize that when employment opportunities are chronically limited in a particular region, legitimate concern about the existence of "hidden" unemployment, and its incidence among alternative cohort groups, is most appropriate. Within a number of counties within the nine-state region encompassed by this study, for example, such chronic limitations of employment opportunities may exist.

Estimates of the amount of "hidden" unemployment may be developed from essentially three types of available data: 1) month-to-month data on the gross flows of individual workers into and out of the labor force, such as those prepared by the Bureau of Labor Statistics;[15] 2) time series data, which relate labor force sizes over time to changes in economic activity levels over similar periods; and 3) cross-section data based on moment-in-time observations which provide approximations to the intertemporal trends. Studies of the latter type are based on estimated relationships between labor force participation rates of given groups of workers and the differing labor market conditions confronted by these groups; such studies provide estimates of "hidden" unemployment through statistical techniques which assess the magnitude and statistical significance of the response of participation rates to (cross-section) changes in the rate of measured unemployment. In the present study, hidden unemployment is analyzed with this latter type of data. The overall rate of unemployment for the county was utilized in the regression equations, rather than sex-specific unemployment rates. Partly, the basis for this selection was that sex-specific employment opportunities available to

the cohort groups analyzed are already captured to some extent by the industrial composition variables described above. It should be emphasized that, because the labor force is composed of unemployed as well as employed persons, the utilization of labor force participation and unemployment rates in the same equation could present a problem of simultaneity. In this investigation, this potential problem is essentially avoided, however, because the participation rates under consideration are both sex and age specific, whereas the unemployment rate utilized is for the total labor force.[16] Thus, in this study, presence or absence of "hidden" unemployment for a specific sex-age cohort in a particular county-size category is indicated by a negative and statistically significant regression coefficient estimated for the unemployment rate variable. In contrast, positive and statistically significant signs for such coefficients may be interpreted as evidence of the dominance of the "additional" worker over the "discouraged" worker effect for such cohort groups. Statistically nonsignificant coefficients for the unemployment rate variable may be interpreted as evidence that the two effects are roughly offsetting.[17]

Ethnic Composition of the Population

A considerable body of empirical evidence has been developed which suggests that the ethnic composition of the population is an important determinant of labor force participation rates; the causal relationships involved, however, are quite complex and difficult to isolate. Nonwhite males generally tend to have lower labor force participation rates than white males. These reduced participation rates for the former group

could be due to labor market discrimination against nonwhite job seekers. The reduced number of potential job openings available to nonwhites may discourage labor market entry or encourage early withdrawal because of the reduced returns to active job search. It is also possible that nonwhite males may possess other characteristics which are associated with reduced labor force activity--lower educational attainment levels, poorer health, less information about labor market opportunities, and similar factors. Evidence provided by Bowen and Finegan on the participation rates of nonwhite vs. white males for the 100 largest SMSA's in 1960 supports these types of complex relationships.[18] In contrast, nonwhite females tend to have higher rates of labor force participation than their white counterparts, but the basic causal forces at work are not entirely clear. In fact, available evidence indicates that this difference in participation rates is not easily accounted for by consideration of additional economic and demographic variables in the analysis.[19]

The influence of the ethnic composition of the county population on labor force participation is accounted for by two variables in this analysis: 1) the percentage of the county population of Spanish origin; and 2) the percentage of the county population of males or females accounted for by American Indians. On the basis of the results of previous studies of labor force participation, a negative (positive) relationship is expected between these percentages and the rate of labor force participation within a county in the equations estimated for males (females).

Urbanization

The nature of the relationship between the economic and demographic variables analyzed in this study and labor force participation rates is expected to be somewhat different in metropolitan counties than in rural areas. Indeed, it was for this reason that the total sample of counties was subdivided into three county-size categories on the basis of the extent of urbanization. In addition to this partitioning of the sample, however, two variables which jointly reflect the extent of urbanization and county size are included in the analysis: 1) the percentage of the county population residing in a place with a population of 2500 or more persons (not used for the smallest county size category for which this variable equals zero); and 2) a population density measure--population per square mile. For a given population density within a county, the greater the fraction of the population residing in places of 2500 or more persons, the larger is the expected level of labor force participation within the county. This hypothesis is based primarily on the premise that opportunities and productivity in the market sector rise relative to those in the nonmarket sectors as the extent of urbanization rises.

Earnings Levels

From the perspective of the individual supplier of labor services, a rise in the (real) wage rate is expected to produce two contrary effects on labor supply decisions: 1) a substitution effect toward increased labor force activity, induced by an increase in the (relative) price of leisure time (or nonmarket production); and 2) a (real) income effect which would tend to increase the demand for all goods and services, including leisure time (if leisure is a "normal" good) and thus reduce labor force participation. The earnings variable included in this analysis is median

earnings of males (females) 16 years or older with earnings who had labor force experience in 1969. Since the variable is sex-specific, the median county earnings variable for males was used only in the equations estimated for males, and similarly for females. Within the present (cross-section) context, higher levels of labor market earnings are likely correlated positively with market wage rates and, because average earnings levels in the counties considered in this analysis are moderate, the substitution effect may well dominate the income effect. Hence, a positive relationship between labor force participation rates and median earnings levels is expected.

Educational Attainment and School Enrollments

The educational attainment of the population within a county is expected to be importantly related to labor force participation rates. Higher levels of schooling increase employment opportunities and expected market earnings rates, and generally facilitate the attainment of more interesting and rewarding work. Increased educational attainment may enhance the desires for social contact through labor force activity, and may increase the "taste" for work itself. The level of educational attainment within a county is measured by two sets of variables. The equations estimated for the seven male (female) age cohorts between the ages of 14 and 44 years contain a variable which measures the percentage of males (females) aged 20-49 years (15-44 years) who had attained at least a high school education. For the oldest two cohort groups of males (females), a variable which measures the percentage of males (females) aged 25 years or older who had attained at least a high school education

was included in the analysis. Cohorts over age 18 in counties with higher levels of educational attainment, as proxied by these variables, are expected to exhibit increased rates of labor force participation, although the effects likely would be less pronounced than if this analysis had been based on observations of individual persons rather than counties within the region. For workers under 18 years of age, higher county-levels of educational attainment would be expected to depress labor force participation rates, if such increased overall levels of schooling imply a competitive disadvantage in securing employment for persons in these two youngest age groups (which likely include few high school graduates).

A second dimension of the relationship between labor force participation and educational attainment included in this analysis relates to the proportions of persons in selected age cohorts currently enrolled in school. From the county census tabulations, data is available on the percentage of persons in the following age cohorts enrolled in school: 16-17 years, 18-19 years, 20-21 years, 22-24 years, and 25-34 years. These percentage values were introduced in the equations estimated for the specific age cohorts to which they correspond. Obviously, a negative relationship is expected between the labor force participation rate of a particular age cohort and the percentage of persons of that age category enrolled in school.

Family Status

Marital status is expected to be an extremely important determinant of labor force participation decisions made by women, and a variable which reflects family status is included in the equations estimated for all of

the female cohorts, except the 14-15 years group. Foregone production in the nonmarket sector of the economy occasioned by labor force activity is expected to be less for single than for married women. In addition, the necessity for market earnings is likely more pressing for the single than for the married group. The variable selected for this analysis was the percentage of women within the county, aged 16 years or more, who were married with husband present. The greater is this proportion within a county, the lower would be the expected level of labor force participation within that county.

Geographic Area

Political boundaries per se would not be expected to exert important influences on the labor force participation rates of the different cohort groups, but the equations estimated in this study have been developed with limited sets of data. Thus, variations in labor force participation among counties not attributable to the other fundamental variables included in this analysis may be related to other influences correlated with the different states within the region. Hence, a set of dummy variables which reflects the state within which a county is located was permitted to enter the regression equations estimated for each of the cohort groups if these variables had statistically significant coefficients after the other variables discussed above had already been included in the equation. Because of the three county-size groupings considered within the overall specification of the model, it was necessary to combine pairs of states for the purpose of establishing these regional dummy variables. In the absence of this aggregation, an insufficient number of observations for

particular states were available in many cases (especially those in large counties) to permit an assessment of the level of statistical significance associated with the regression coefficients estimated for these variables.[20] There is, of course, no unambigious way in which these intercept shifts of the labor force participation equations may be interpreted to reflect causal forces at work.

Specification of the Model

Although the general structure of the model described in equation (2) appears quite appropriate, numerous specifications were obviously possible within the limits provided by the data available for this analysis. Hence, a substantial amount of experimentation was undertaken to identify the "most" appropriate specification to be utilized for the set of 54 equations estimated. Criteria for the selection of the final specification included: 1) logical consistency of the empirical results with hypothesized relationships; 2) overall predictive power of the estimation equations; and 3) a pattern of residual values (differences between predicted and actual values) consistent with the absence of heteroskedastic patterns. The following equation was estimated for this study:

$$\text{(3)} \quad LFPR_{ijk} = b_0 + b_1 \left[\frac{E_{i1}}{E_1}\right]_S \cdot \left[\frac{E_{1k}}{POP_{ik}}\right] + b_2 \left[\frac{E_{i2}}{E_2}\right]_S \cdot \left[\frac{E_{2k}}{POP_{ik}}\right]$$

$$+ \ . \ . \ . + b_{10} \left[\frac{E_{i10}}{E_{10}}\right]_S \cdot \left[\frac{E_{10k}}{POP_{ik}}\right] + b_{11} UN_k$$

$$+ b_{12} SPAN_k + b_{13} IND_{ik} + b_{14} URB \geq 2500_k + b_{15} POPSQMI_k$$

$$+ b_{16}MEDEARN_{ik} + b_{17}PCTSCH_{jk} + b_{18}PCTHISCH_{ik} + b_{19}PCTMARHP_{k}$$

$$+ b_{20}AZ\text{-}NM_{k} + b_{21}ND\text{-}SD_{k} + b_{22}COLO\text{-}UT_{k} + b_{23}WYO\text{-}MON_{k} + e$$

where:

b_0 is the intercept of the regression equation.

$\left[\frac{E_{i1}}{E_1}\right]_S, \left[\frac{E_{i2}}{E_2}\right]_S, \ldots \left[\frac{E_{i10}}{E_{10}}\right]_S$ denotes the percentage of employment of the i^{th} sex in the S^{th} county size group for industries 1, 2, . . . 10, respectively

$E_{1k}, E_{2k}, \ldots E_{10k}$ denotes the level of total employment in the k^{th} county, for industries 1, 2, . . . 10, respectively.

POP_{ik} denotes the total number of the i^{th} sex of labor force age residing in the k^{th} county.

UN_k denotes the overall unemployment rate in the k^{th} county.

$SPAN_k$ denotes the percentage of total population in the k^{th} county accounted for by persons of Spanish origin.

IND_{ik} denotes the percentage of total population of the i^{th} sex in the k^{th} county accounted for by Indian persons.

$URB \geq 2500_k$ denotes the percentage of total population in the k^{th} county residing in places of population size of 2500 or more persons (not included in the equations estimated for small counties).

$POPSQMI_k$ denotes population per square mile in county k.

$MEDEARN_{ik}$ denotes the median earnings of experienced labor force members of the i^{th} sex in the k^{th} county aged 16 years or more with earnings.

$PCTSCH_{jk}$ denotes the percentage of persons in the j^{th} age cohort in the k^{th} county enrolled in school (this variable applies only for the following age cohorts: 16-17 years, 18-19 years, 20-21 years, 22-24 years and 25-34 years).

$PCTHISCH_{ik}$ denotes the percentage of males (females) aged 20-49 (15-44 years) in the k^{th} county who had completed at least 4 years of high school (used only for the age cohorts of either sex between the ages of 14 and 44 years); or for the oldest age cohorts (45-64 years and 65 years and up) of either sex, this variable denotes the percentage of persons aged 25 years or more who had completed at least 4 years of high school.

$PCTMARHP_k$ denotes the percentage of females in the k^{th} county aged 16 years and older who were married with husband present (used only in the equations estimated for females, but not for the 14-15 years age cohort).

$AZ\text{-}NM_k$ equals 1 if the k^{th} county is in Arizona or New Mexico, otherwise equals 0.

$ND\text{-}SD_k$ equals 1 if the k^{th} county is in North Dakota or South Dakota, otherwise equals 0.

$COLO\text{-}UT_k$ equals 1 if the k^{th} county is in Colorado or Utah, otherwise equals 0.

$WYO\text{-}MONT_k$ equals equals 1 if the k^{th} county is in Wyoming or Montana, otherwise equals 0.

NEBRASKA omitted as benchmark.

e denotes a randomly distributed error term.

Each of the 54 equations (for the 18 sex-age cohort groups in the three county-size categories) was estimated with ordinary least squares regression analysis. No weighting formula was utilized to reflect the different geographic sizes or total populations of the counties within each size category. Such weighting procedures have been used in some studies of labor force participation behavior to reduce the problems associated with heteroskedasticity. Inspection of the patterns of residual values which resulted from the unweighted regression equations estimated for this study, however, indicated that such procedures were not required for this analysis.

Several sets of regression results are provided in this report. The emphasis in the text is on the equations estimated with the full range of "explanatory" variables described in equation (3). Two additional sets of regression results, which were estimated with a somewhat more restricted list of variables, are provided in Appendix E. Included in that set of regression results are the equations provided in the Interim Report for this study. A discussion of the procedures employed to estimate those equations, and an additional set of equations requested by one of the modeling groups, are also provided in Appendix E.

Empirical Results

The general patterns of statistical results and the overall importance of the variables included in the regression equations are emphasized in the discussion below. A specific discussion of each individual regression equation estimated for individual cohort groups is not provided. Because of the well known differences in the labor force participation rates of men and women, a separate section is devoted to the cohort groups of each sex.

Female Cohorts

The regression results for women are summarized in Table 1. The summary provided in that table condenses the results for the nine age cohorts into a single row for each of the three county size groups. Thus, in utilizing Table 1 as a summary device, it should be noted that it would be possible to have a maximum of nine statistically significant coefficients (one for each age cohort) for most of the variables for any

Table 1

SUMMARY OF REGRESSION RESULTS FOR FEMALE COHORTS

Labor Force Partici- pation Rates / VARIABLES- Regression Coefficient (Standard Error)	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Female Indian	Percent Urban	Population Per Square Mile	Female Median Earnings	Percent in School by Age	Percent Female 15-44 with at least 4 yrs high school educa.	Percent Female over 25 with at least 4 yrs H.S. education	Percent Married with Husband Present	R^2 Range for 9 age groups
Females: Counties with a city of at least 10,000	2	2	3	3	1	5	1	3	5	0	1	3	5	0	0	2	1	1	2	8	.45 to .80
Females: Counties with a city of at least 2,500 but less than 10,000	1	1	5	1	1	3	2	8	2	1	1	2	3	1	0	0	0	0	2	2	.29 to .73
Females: Counties with no city of 2,500 or more	3	2	2	0	0	4	1	5	4	2	1	1	1	--[b]	2	0	0	1	1	1	.17 to .58
Significant Coeffi- cients: Totals	6	5	10	4	2	12	4	16	11	3	3	6	9	1	2	2	1	2	5	11	

NOTES: [a] See Tables 2, 3, and 4 for regression results for each sex-age cohort. State dummy variables not summarized here, but very few of the coefficients for these variables were statistically significant.

[b] Indicates variable not relevant for county size group.

one of the county size groups; however, the three different educational variables and the percent married with husbands present variable were not utilized in each equation, so that fewer significant coefficients were possible for these variables.[21] Because equations were estimated for nine age groups for each of the three county size groups, Table 1 provides a summary of the results for 27 different equations. Overall, the "explanatory power" of the equations estimated is indicated by the range of R^2 values, from a low of .17 to a high of .80. The range of the values of R^2 for each county size group (see Table 1) -- .17 to .58 for "small" counties, .29 to .73 for "intermediate" counties and .45 to .80 for "large" counties -- reflects the general level of the explanatory power of the nine equations for each county group.[22] For women, at least, it appears that influences in addition to those controlled for in the analysis (including "noneconomic" considerations) may be particularly important in explaining labor force participation behavior in small counties. The discussion of specific results is organized around the eight basic groups of variables described earlier in this report, with references to the summary provided in Table 1. The interested reader also is referred to Tables 2, 3, and 4 which provide the more detailed regression results for the nine age cohorts in large, intermediate, and small counties, respectively.

Relative Sex-Industry Employment Opportunity Indexes. As explained above, each of the ten employment opportunity indexes (EOI) was computed separately for each sex within a given county size group. For each group, the value of an EOI variable for a particular industry in a county represents the number of jobs in that industry expected to be available to

Table 2

REGRESSION RESULTS FOR FEMALE COHORTS IN LARGE COUNTIES

VARIABLES- Regression Coefficient (Standard Error) / Labor Force Participation Rates By AGE:	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)	Percent Urban	Population Per Square Mile	Female Median Earnings	Percent in School by Age	Pct. Female 15-44 with at least 4 yrs. High School	Pct. Female over 25 with at least 4 yrs. High School	Pct. Married with Husband Present	Standard Error	F (d.f.)	
14-15 ($\bar{x}$= 11.3)	1.81	2.523 (1.70)	.153 (1.43)	-.202 (.299)	.969 (.915)	-9.556 (1.97)	-.041 (.435)	.471 (1.01)	.152 (.131)	-.136 (.139)	-.234 (.465)	-.484 (.435)	-.074 (.055)	.107 (.078)	.090 (.058)	.000 (.001)	-.002 (.002)		.173 (.101)			4.15	2.94 (62)	.4
16-17 ($\bar{x}$= 27.4)	39.42	-.033 (2.19)	.902 (1.95)	.654 (.451)	1.481 (1.19)	-.981 (2.54)	1.077 (.585)	1.328 (1.28)	* .465 (.193)	.295 (.216)	.100 (.583)	-1.145 (.579)	* -.164 (.071)	-.138 (.099)	.029 (.074)	-.001 (.001)	-.002 (.002)	-.021 (.162)	.059 (.133)		** -.404 (.118)	5.19	5.46 (60)	.6
18-19 ($\bar{x}$= 46.8)	69.04	.458 (2.96)	-2.090 (2.77)	.521 (.613)	3.215 (1.61)	6.540 (3.39)	* 1.866 (.803)	.053 (1.73)	.011 (.289)	.324 (.367)	.374 (.792)	-.364 (.794)	* -.240 (.094)	** -.433 (.134)	.007 (.101)	-.002 (.002)	.004 (.003)	-.236 (.123)	-.197 (.182)		** -.536 (.196)	7.00	5.50 (60)	.6
20-21 ($\bar{x}$= 53.9)	58.91	1.889 (2.81)	.714 (2.56)	* 1.288 (.586)	2.194 (1.53)	** 8.729 (3.18)	** 2.775 (.759)	.785 (1.65)	.279 (.265)	** 1.262 (.327)	.903 (.754)	-.044 (.746)	-.064 (.091)	-.165 (.127)	-.071 (.095)	-.002 (.002)	.000 (.003)	** -.365 (.070)	.297 (.182)		** -.923 (.176)	6.66	7.33 (60)	.7
22-24 ($\bar{x}$= 51.8)	17.42	3.695 (2.07)	-1.946 (1.84)	.577 (.443)	** 3.404 (1.13)	3.360 (2.33)	.839 (.551)	1.832 (1.20)	** .492 (.185)	* .612 (.240)	.637 (.559)	.795 (.558)	.091 (.069)	* .231 (0.95)	.104 (.070)	.000 (.001)	.001 (.003)	-.081 (.082)	** .374 (.138)		** -.615 (.119)	4.90	9.13 (60)	.74
25-34 ($\bar{x}$= 42.4)	25.92	* 3.786 (1.51)	2.189 (1.34)	* .675 (.320)	* 1.667 (.826)	-2.478 (1.71)	* .982 (.407)	** 3.027 (.879)	.226 (.134)	* .412 (.171)	.075 (.407)	.170 (.398)	.055 (.050)	.060 (.070)	-.042 (.051)	.000 (.051)	* .004 (.002)	-.018 (.126)	.110 (.099)		** -.476 (.082)	3.58	5.60 (60)	.64
35-44 ($\bar{x}$= 48.5)	52.61	.178 (1.59)	** 3.921 (1.41)	** 1.334 (.327)	** 2.454 (.866)	-3.246 (1.79)	** 1.276 (.424)	1.428 (.922)	** .374 (.140)	** .681 (.156)	-.448 (.422)	-.121 (.414)	-.039 (.050)	* -.161 (.072)	-.047 (.053)	.000 (.001)	.002 (.002)		-.017 (.095)		** -.535 (.085)	3.77	4.89 (61)	.59
45-64 ($\bar{x}$= 46.8)	32.39	.349 (1.30)	1.685 (1.05)	.373 (.243)	-.292 (.652)	-.279 (1.36)	** 1.500 (.334)	.810 (.721)	.115 (.112)	** .487 (.112)	.071 (.317)	-.541 (.307)	** -.115 (.038)	* -.134 (.056)	-.012 (.040)	.000 (.001)	* .0025 (.001)			** .209 (.075)	** -.366 (.062)	2.83	13.26 (61)	.80
65 and over ($\bar{x}$= 10.9)	-.41	* 2.209 (.930)	* 1.928 (.751)	-.214 (.173)	.434 (.466)	-.086 (.972)	.338 (.239)	-.425 (.515)	.062 (.080)	.078 (.080)	.280 (.227)	** -.652 (.219)	-.029 (.027)	* .081 (.040)	.034 (.029)	.000 (.001)	.001 (.001)			* .130 (.054)	* -.089 (.044)	2.03	3.92 (61)	.54

*significant at the .05 level **significant at the .01 level

Table 3

REGRESSION RESULTS FOR FEMALE COHORTS IN INTERMEDIATE COUNTIES

VARIABLES-Regression Coefficient (Standard Error) / Labor Force Participation Rates By AGE:	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)	Percent Urban	Population Per Square Mile	Female Median Earnings	Percent in School by Age	Pct. Female 15-44 with at least 4 yrs. High School	Pct. Female over 25 with at least 4 yrs. High School	Pct. Married with Husband Present	Standard Error	F (d.f.)	R^2
14-15 ($\bar{x}$= 13.0)	-17.09	3.307 (1.79)	2.804 (2.01)	* 1.150 (.534)	1.133 (1.12)	-1.111 (2.21)	** 1.239 (.434)	.370 (1.25)	** .922 (.265)	-.354 (.342)	.545 (.541)	.021 (.402)	.023 (.051)	.078 (.084)	-.010 (.052)	.015 (.091)	-.001 (.002)		.085 (.124)			5.71	2.89 (98)	.33
16-17 ($\bar{x}$= 25.4)	0.88	1.462 (2.69)	2.066 (3.52)	* 1.739 (.841)	1.617 (1.76)	4.412 (3.29)	1.240 (.68)	2.339 (1.87)	** 1.750 (.393)	.368 (.511)	1.027 (.811)	.850 (.605)	* -.196 (.077)	-.187 (.126)	.038 (.083)	-.006 (.145)	-.003 (.003)	-.109 (.149)	-.064 (.187)		-.061 (.291)	8.45	4.84 (96)	.49
18-19 ($\bar{x}$= 44.7)	50.96	3.062 (3.85)	.027 (5.08)	1.809 (1.21)	1.184 (2.56)	-.784 (4.75)	-.086 (.969)	* 6.706 (2.71)	* 1.136 (.574)	1.142 (.741)	.103 (1.17)	-.664 (.867)	* -.246 (.113)	* -.401 (.181)	.020 (.120)	.180 (.210)	-.005 (.004)	-.074 (.105)	-.544 (.276)		.159 (.441)	12.19	2.71 (96)	.35
20-21 ($\bar{x}$= 47.8)	34.95	-3.080 (3.94)	-6.253 (5.17)	-.044 (1.23)	3.625 (2.57)	.967 (4.80)	.601 (.990)	1.149 (2.71)	.725 (.580)	1.046 (.784)	.723 (1.23)	-.177 (.880)	-.049 (.113)	-.245 (.186)	-.193 (.122)	.236 (.213)	.002 (.004)	-.193 (.101)	.368 (.278)		-.334 (.462)	12.37	2.06 (96)	.29
22-24 ($\bar{x}$= 45.0)[a]	39.32	.702 (2.92)	-1.133 (4.42)	* 2.012 (.904)	1.188 (1.94)	6.701 (3.41)	.845 (.691)	3.787 (1.92)	** 1.408 (.402)	* 1.322 (.582)	-.326 (.824)	.075 (.658)	-.050 (.081)	-.037 (.133)	-.068 (.084)	.164 (.159)	-.003 (.003)	.073 (.106)	-.213 (.191)		-.227 (.341)	8.53	4.35 (94)	.49
25-34 ($\bar{x}$= 38.3)	24.96	1.289 (1.62)	.532 (2.16)	.935 (.512)	1.549 (1.07)	-1.993 (2.04)	.702 (.408)	1.680 (1.14)	** 1.149 (.239)	.625 (.354)	.518 (.492)	-.088 (.365)	.040 (.048)	.079 (.077)	-.021 (.050)	.011 (.088)	.000 (.001)	-.296 (.182)	.164 (.114)		* -.374 (.188)	5.13	4.53 (96)	.47
35-44 ($\bar{x}$= 46.0)	12.27	2.653 (1.88)	4.010 (2.48)	** 1.751 (.592)	1.074 (1.24)	-4.417 (2.31)	** 1.910 (.474)	* 3.338 (1.32)	** .942 (.278)	.446 (.360)	.121 (.572)	.539 (.424)	.005 (.055)	-.043 (.088)	.035 (.059)	-.008 (.103)	.000 (.002)		.081 (.129)		-.273 (1.88)	5.96	4.65 (97)	.46
45-64 ($\bar{x}$= 43.0)[b]	-7.66	** 4.946	2.834 (1.66)	** 1.417 (.397)	* 1.803 (.834)	** 3.887 (1.42)	** 1.430 (.303)	-.934 (.823)	** 1.029 (.177)	* .607 (.233)	* .823 (.350)	* .708 (.274)	-.060 (.035)	* .111 (.050)	* .092 (.037)	-.026 (.066)	.001 (.001)			* .192 (.083)	-.149 (.131)	3.74	13.52 (96)	.73
65 and over ($\bar{x}$= 10.3)	6.91	1.252 (.993)	** 3.584 (1.34)	-.106 (.316)	.361 (.644)	1.685 (1.181)	.103 (.251)	-.306 .680	** .464 (.148)	-.083 (.194)	.207 (.292)	-.091 (.220)	-.009 (.029)	* .097 (.042)	-.159 (.309)	.033 (.052)	.0017 (.001)			* .150 (.069)	* -.279 (.108)	3.13	3.46 (97)	.39

*significant at the .05 level　　**significant at the .01 level

[a]Dummy Variable Entered: -9.861** (Colorado-Utah): (2.43)
-7.885* (Wyoming-Montana): (2.83)

[b]Dummy Variable Entered: -3.281* (Wyoming-Montana): (1.16)

Table 4

REGRESSION RESULTS FOR FEMALE COHORTS IN SMALL COUNTIES

VARIABLES-Regression Coefficient (Standard Error) / Labor Force Participation Rates By AGE:	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)		Population Per Square Mile	Female Median Earnings	Percent in School by Age	Pct. Female 15-44 with at least 4 yrs. High School	Pct. Female over 25 with at least 4 yrs. High School	Pct. Married with Husband Present	Standard Error	F (d.f.)	R^2
14-15 ($\bar{x}$= 10.9)	-11.54	2.278 (1.82)	* 8.906 (4.42)	.095 (.856)	3.334 (2.90)	2.908 (3.24)	.850 (.552)	* 3.453 (1.66)	.003 (.302)	-.018 (.445)	.592 (1.07)	-.202 (.430)	-.039 (.068)	.097 (.094)		.296 (.220)	.001 (.002)		-.028 (.150)			7.87	1.84 (106)	.22
16-17 ($\bar{x}$= 21.2)	.31	2.130 (2.21)	-.897 (5.94)	.440 (.996)	3.810 (3.52)	-2.496 (3.80)	** 2.482 (.650)	-1.189 (1.95)	.192 (.383)	-.547 (.527)	* 3.275 (1.24)	.682 (.501)	-.003 (.082)	.067 (.113)		.076 (.255)	-.004 (.002)	-.010 (.121)	.279 (.179)		-.211 (.313)	9.09	3.09 (104)	.35
18-19 ($\bar{x}$= 35.9)[a]	-4.96	7.060 (3.82)	4.236 (10.2[illegible])	.463 (1.76)	4.150 (6.06)	2.455 (6.63)	1.006 (1.11)	-2.424 (3.39)	* 1.820 (.652)	* 2.331 (.905)	2.424 (2.19)	1.264 (.873)	-.209 (.148)	-.368 (.200)		* .888 (.443)	-.006 (.004)	-.121 (.106)	-.260 (.325)		.188 (.536)	15.67	2.40 (103)	.31
20-21 ($\bar{x}$= 40.7)	-35.29	3.160 (4.75)	-12.306 (12.68)	-.664 (2.14)	11.666 (7.53)	.283 (8.28)	1.550 (1.40)	-2.011 (4.23)	.916 (.801)	1.586 (1.18)	1.805 (2.77)	.925 (1.08)	.129 (.177)	-.140 (.244)		** 1.470 (5.50)	.007 (.005)	.018 (.146)	.224 (.377)		-.083 (.667)	19.57	1.17 (104)	.17
22-24 ($\bar{x}$= 41.0)	12.31	** 8.280 (2.80)	3.533 (7.58)	1.791 (1.27)	5.838 (4.47)	5.516 (4.87)	* 1.740 (.821)	1.750 (2.50)	** 1.509 (.473)	** 1.851 (.699)	-.837 (1.60)	.284 (.637)	-.030 (.104)	.076 (.143)		4.27 (.329)	.001 (.003)	.049 (.200)	-.374 (.223)		-.314 (.392)	11.59	2.54 (104)	.31
25-34 ($\bar{x}$= 34.1)	-3.16	* 4.234 (1.78)	7.608 (4.74)	* 1.903 (.801)	2.396 (2.82)	-1.673 (3.06)	** 1.432 (.517)	-.109 (1.57)	** 1.048 (.299)	.564 (.433)	.393 (1.00)	-.010 (.402)	.123 (.066)	* .222 (.091)		.211 (.210)	-.002 (.002)	.531 (.308)	.255 (.141)		-.255 (.247)	7.32	5.52 (104)	.49
35-44 ($\bar{x}$= 40.9)[b]	8.58	3.377 (1.96)	-2.007 (5.27)	1.408 (.903)	4.077 (3.11)	3.687 (3.40)	.794 (.570)	-1.655 (1.73)	** 1.572 (.331)	* 1.199 (.458)	.909 (1.10)	.654 (.448)	-.140 (.080)	-.150 (.099)		.002 (.226)	-.001 (.002)		* -.330 (.165)		.201 (.273)	8.04	3.90 (104)	.40
45-64 ($\bar{x}$= 39.5)	36.92	** 5.353 (1.32)	** 15.200 (3.59)	** 2.578 (.614)	3.129 (2.05)	3.122 (2.23)	** 1.224 (.381)	.824 (1.17)	** .699 (.213)	** 1.140 (.315)	** 2.090 (.727)	-.040 (.290)	-.081 (.047)	-.028 (.065)		.045 (.147)	-.002 (.002)			.018 (.082)	** -.625 (.179)	5.35	9.17 (105)	.60
65 and over ($\bar{x}$= 10.9)	-10.11	3.382 (2.08)	6.531 (5.66)	-.138 (.969)	.399 (3.23)	-1.636 (3.52)	.214 (.602)	1.106 (1.84)	.199 (.336)	-.226 (.496)	1.746 (1.15)	.157 (.459)	** .250 (.073)	.134 (.103)		.227 (.232)	.002 (.002)			* .287 (.130)	-.249 (.283)	8.45	1.82 (105)	.23

*significant at the .05 level **significant at the .01 level

[a] Dummy Variable Entered: -10.336** (N. Dakota - S. Dakota): (3.88)

[b] Dummy Variable Entered: -4.216* (N. Dakota - S. Dakota): (1.99)

women in that industry and county, relative to the number of women of labor force age in that county.[23] Obviously, to the extent to which relative opportunities in an industry have any effect on labor force participation decisions, increased values of.any EOI variable generally would be expected to result in increased labor force participation. Overall, these industry EOI variables were importantly related to labor force participation rates for women -- a total of 73 of the coefficients for these variables were statistically significant at least at the .05 level (see Table 1) and each of these significant coefficients had a positive sign. Increased opportunities in the services industry group, one of the major sources of employment for women, were associated with (significantly) increased labor force participation rates for 16 of the 27 cohorts in the three county size groups. The retail trade, government, and manufacturing industry groups followed the services category in terms of statistically significant coefficients with 12, 11, and 10 recorded, respectively, for these three industry variables. The number of statistically significant coefficients for the other industry variables was six for agriculture, five for construction-mining, four each for transportation-communication and banking-finance-insurance, and three for other education.

The magnitude of the estimated labor force participation increase in response to a 1 percent increase in the (expected) relative employment opportunities for women in any of the ten industrial categories varies considerably. For the variables with statistically significant coefficients, the smallest estimated effect was for the services variable for 35-44 year old women in large counties (see Table 2), and the largest

effect was for the construction-mining variable for 45-64 year old women in small counties (see Table 4). A 1 percent increase in the relative opportunities for women was estimated to increase labor force participation rates by only about 0.4 percent in the former case, but by more than 15 percent in the latter case. Between these response extremes, nearly half of the remaining significant coefficients indicate that a 1 percent increase in the relative employment opportunities in a particular industry increased labor force participation rates by 1-2 percent, about three-fourths had coefficients below 3.0 percent, and only about one-tenth of the significant coefficients had values larger than 4.0 percent.

At a general level, there were few marked differences in the number of significant coefficients for any particular industry group across the three county size groups (see Table 1). An exception is the services variable, for which a significant coefficient was estimated for eight of the nine age cohorts in intermediate counties, compared with significant coefficients for five age cohorts in the small counties and three age cohorts in the large county group. A less pronounced pattern was found for the manufacturing variable for which significant coefficients were recorded for five groups in the intermediate counties, three groups in the large counties and two groups in the small counties. Greater relative opportunities in the transportation-communication group were associated with higher participation rates for three age cohorts in large counties but only for one cohort in intermediate counties and none for small counties. Increased opportunities in government were more often related to increased participation rates in large and small counties

(with five and four significant coefficients, respectively) than in intermediate counties where an increase in the government EOI variable resulted in higher participation rates for only two age groups. Much smaller differences in the effects on labor force participation rates of increases in the respective EOI variables were found among the three county size breaks for the remaining six industry variables. Moreover, even though some differences in the importance of particular industry variables were recorded for the three county size groups, these differences were usually offsetting so that the total number of statistically significant coefficients for the industry variables was nearly identical for each county size group (25 for large and intermediate counties, and 23 for small counties).

Examination of the regression coefficients estimated for the industrial variables for each age cohort in the three county size groups reveals some additional patterns of interest (see Tables 2, 3, and 4). These patterns are summarized in Table 5 which presents the number of statistically significant coefficients for the industry EOI variables, classified by age group and county size category. The age cohorts for which the greatest number of statistically significant coefficients was estimated for the industry EOI variables vary somewhat among the three county size groups. For the large counties, the greatest number of significant coefficients was recorded for the 25-34 and 35-44 age groups (6 for each), followed by the 20-21 and 22-24 age cohorts with four and three significant coefficients, respectively. For intermediate counties, eight of the ten industrial EOI variables had significant coefficients for the 45-64 age category, four significant coefficients were estimated

Table 5

NUMBER OF STATISTICALLY SIGNIFICANT COEFFICIENTS ESTIMATED FOR RELATIVE INDUSTRY EMPLOYMENT OPPORTUNITY INDEXES FOR FEMALE COHORTS[a]

Age Group	Large Counties	Intermediate Counties	Small Counties	Total
14-15	0	3	2	5
16-17	1	2	2	5
18-19	1	2	2	5
20-21	4	0	0	4
22-24	3	3	4	10
25-34	6	1	4	11
35-44	6	4	2	12
45-64	2	8	7	17
65 & over	2	2	0	4
TOTALS	25	25	23	73

[a] See Tables 2, 3, & 4 for the complete regression results for large, intermediate, and small counties, respectively.

for the 35-44 age group, and three significant coefficients were found for both the youngest group and the 22-24 age category. Most of the statistically significant coefficients estimated for the industry EOI variables in the equations for small counties were concentrated among three age groups -- seven for the 45-64 age cohort and four each for the 22-24 and 25-34 age groups. If the pattern of significant coefficients among the various age groups is considered for all county size groups together, the apparently varying importance of the industry EOI variables for the various age groups in each county size group is replaced by a clear pattern. For all county size groups considered together, the industry EOI variables are most important for those of prime labor force age, from 22 years through 64 years, and least important for younger and older workers (see Table 5). The four age cohorts that comprise workers

in the 22-64 age interval account for 50 of the significant coefficients for this set of variables, whereas the other five age cohorts account for only 23 of them. Thus, as would be expected, industrial employment opportunities more often influence the labor force decisions of prime age females than the decisions of either younger or older workers.

The Unemployment Rate. Variations in the unemployment rate among these counties had very little effect on the labor force participation rates of women in these counties. The estimated coefficients are quite small in nearly all cases, with a total of only three coefficients larger than 1.0. Thus, for 24 of the 27 cohorts, a 1 percent increase in the unemployment rate (e.g., from 3.0% to 4.0%) resulted in a change of less than 1 percent in labor force participation rates (see Tables 2, 3, and 4). Moreover, only three of these 27 (small) unemployment rate coefficients had statistically significant coefficients, one for a single age cohort in each of the three county size groups. Moreover, two of these three coefficients had positive signs, an indication that the additional worker effect outweighed the discouraged worker effect in these two cases. Even if the statistically nonsignificant coefficients are considered, only 14 of the 27 unemployment rate coefficients had negative signs. This pattern of results indicates that the discouraged and additional worker effects apparently were approximately offsetting. Thus, increased unemployment apparently had little effect on the labor force participation decisions of women in these counties on labor force participation rates, and there is no indication provided by these results that a considerable amount of "hidden unemployment" existed among the female cohorts in the region in 1970. These findings may well be

explained by two factors. First, low average unemployment rates were recorded throughout the region during 1970 -- 4.8 percent for large counties, 4.4 percent for intermediate counties, and 3.9 percent for small counties. During periods of relatively high economic activity levels, little hidden unemployment might well be expected, and the estimates indicate that marginal changes in the unemployment rate had little effect on labor force participation rates. Secondly, it should be emphasized that the industry EOI variables also reflect the impact of labor demand on labor force participation rates and, as discussed above, increased industry opportunities were frequently related to increased labor force participation rates.

Ethnic Composition. The two measures of ethnic composition included were the percent of men and women accounted for by Spanish persons and the percentage of women accounted for by Indian persons. It was hypothesized that women in counties with higher proportions of either Spanish or Indian persons would have higher participation rates, but the results provide, at best, weak support for the hypothesis. Six statistically significant coefficients (of a possible 27) were estimated for the Spanish variable and only one of these had the expected positive sign (see Tables 2, 3, and 4). Moreover, in the case of the Indian variable, only five of the nine significant coefficients had positive signs. Thus, ethnic composition apparently had a small and somewhat inconsistent effect on the participation rates of women of various ages in this region.

Urbanization and Density. It was expected that greater urbanization, for a given population density, would be associated with (significantly) increased labor force participation rates in intermediate and large

counties (an analogous urbanization variable was not available for the smallest county size category). This was the case, however, for only one of the 18 age cohorts in these two county size groups (see Tables 2 and 3). For small counties, greater population density was associated with higher participation rates for only two age cohorts. In short, urbanization measures were not important labor force determinants for women. In part, this may be due to the crude measures of urbanization which were available for the analysis.

Median Earnings. Increased earnings result in two conflicting effects on labor force participation rates -- a substitution effect which makes nonparticipation in the labor market relatively less attractive and an income effect, through higher earnings, which makes more leisure (nonparticipation) more attractive. The empirical estimates indicate that these two effects were roughly offsetting for nearly all age cohorts, and this resulted in statistically nonsignificant coefficients for all but two of the 27 age groups (see Tables 2, 3, and 4). In the case of the two significant coefficients -- for women 25-34 and 45-64 years of age in large counties -- the substitution effect apparently dominated so that higher county earnings resulted in higher participation rates. Even in these cases, however, the effects were fairly modest, with a $1,000 increase in median earnings associated with a maximum increase in labor force participation of only about 4 percent.

Educational Variables. The first of the three schooling or educational variables included was the percentage of each of the age cohorts between 16-34 years of age that was enrolled in school. The larger the percentage of any age cohort enrolled in school in a county, the smaller

would be the expected labor force participation rate for that age cohort. Consistent with this expectation, 11 of the 15 coefficients for this variable have negative signs, although only one of these coefficients is statistically significant at the .05 level (see Tables 2, 3, and 4).

One variable to reflect the general level of educational attainment within a county was included in all equations estimated, although two different measures were utilized. The percentage of women 15-44 years of age with at least a high school education is available from census data and this measure was utilized for the seven age cohorts in this age range. For the two older age categories, the proxy for educational attainment utilized was the percentage of women over 25 years with at least a high school education. Only two of the 21 educational coefficients estimated for the cohorts less than 45 years of age were statistically significant and, contrary to expectations, one of these coefficients actually had a negative sign (see Tables 2, 3, and 4). For women less than 45 years old, therefore, increased education generally had little effect on labor force participation rates. For the two oldest age groups in the three county size categories, however, women in counties with a larger proportion of high school graduates did have (significantly) higher labor force participation rates (in five of the six cases), as was hypothesized. Thus, for women in this region, education apparently was importantly related to labor force participation decisions for older but not for younger workers.

Percentage Married with Husband Present. Although the gap in labor force participation rates between women married with husbands present and other women has been closing rather dramatically in recent years,

the former group continues to participate in the labor market less frequently than the latter group. Consistent with this pattern of labor force participation, 23 of the 24 coefficients estimated for this variable have negative signs (see Tables 2, 3, and 4). It should be noted, however, that only 11 of these 23 coefficients are statistically significant at the .05 level. Interestingly, increases in this variable resulted in significantly lower participation rates for each age group for women in large counties, but had the effect of significantly reducing labor force participation rates for only three of the 16 age cohorts in intermediate and small counties. Apparently, marriage serves as less of a constraint on labor force participation for women in less urbanized areas, perhaps a reflection of the greater possibility of arranging for satisfactory child care in smaller places.

Male Cohorts

The regression results for the 27 equations estimated for men are summarized in Table 6. As was the case for women, a maximum of nine statistically significant coefficients was possible for each county size group for most of the variables included in the equations.[24] Generally, the equations estimated account for more than half of the observed variations in labor force participation rates for these cohorts. The "explanatory power" of the equations generally is higher for the large county size group than for the other two groups, as was also the case for females. The equations estimated for seven of the nine age cohorts in large counties have R^2 values of at least .60, compared with R^2 values of this magnitude for only four of the equations estimated for intermediate

Table 6

SUMMARY OF REGRESSION RESULTS FOR MALE COHORTS

VARIABLES-Regression Coefficient (Standard Error) / Labor Force Partici-pation Rates	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, and Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)	Percent Urban	Population Per Square Mile	Male Median Earning	Percent in School by Age	Percent Males 20-49 with at least 4 yrs high school educa.	Percent Males over 25 with at least 4 years H.S. educa.	R^2 Range for 9 age groups
Males: Counties with a city of at least 10,000	6	1	2	0	0	4	1	5	2	1	1	2	2	6	0	3	4	4	1	.43 to .80
Males: Counties with a city of at least 2,500 but less than 10,000	6	7	6	1	3	4	1	2	1	1	0	3	0	1	1	0	4	2	2	.26 to .78
Males: Counties with no city of 2,500 or more	9	6	3	2	0	2	0	2	2	0	1	3	4	--[b]	0	0	2	1	1	.26 to .81
Significant Coeffi-cients: Totals	21	14	11	3	3	10	2	9	5	2	2	8	6	7	1	3	10	7	4	

Notes: [a] See Tables 7, 8, and 9 for the actual regression results for males. State dummy variables not summarized here, but very few of the coefficients for these variables were statistically significant.

[b] Indicates variable not relevant for county size group.

counties and one of the equations estimated for small counties. Nonetheless, most of the equations for each size group have R^2 values of at least .50, and 20 of the 27 equations estimated have R^2 values at least this high. The discussion of results is organized around variable groups, with references to the summary provided in Table 6. The interested reader also is referred to Tables 7, 8, and 9 which contain the specific regression results for the nine age cohorts in large, intermediate, and small counties, respectively.

Relative Sex-Industry Employment Opportunity Indexes. Overall, the industry EOI variables are importantly related to the labor force participation rates of the males in each county size group. A total of 80 of the coefficients estimated for these variables are statistically significant at least at the .05 level although, as will be discussed below, seven of the significant coefficients for the large county group actually have negative signs. An indication of the strength of increases in industrial employment opportunities in increasing male labor force participation rates is provided by the range of the values for the statistically significant (and positive) coefficients for these variables (see Tables 7, 8, and 9). The smallest of these coefficients is .17 for the manufacturing coefficient for males in large counties, and the largest is 4.12 for the retail trade variable for males in small counties. Overall, more than 50 of these coefficients are less than 1.0 and only five of them exceed 2.0. Thus, for the variables with statistically significant coefficients, a 1 percent increase in employment opportunities in a particular industry generally resulted in labor force participation increases of less than 1 percent. Employment opportunities in agriculture

Table 7

REGRESSION RESULTS FOR MALE COHORTS IN LARGE COUNTIES

VARIABLES- Regression Coefficient (Standard Error) / Labor Force Partici- pation Rates By AGE:	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)	Percent Urban	Population Per Square Mile	Male Median Earnings	Percent in School by Age	Pct. Males 20-49 with at least 4 yrs High School	Pct. Males over 25 with at least 4 yrs High School	Standard Error	F (d.f.)	R^2
14-15 ($\bar{x}$= 18.7)	-13.87	** .600 (.217)	-.015 (.117)	.117 (.123)	-.117 (.251)	-.711 (.549)	-.084 (.401)	-.018 (.903)	.470 (.240)	-.007 (.121)	-.317 (.711)	-.018 (.400)	* -.137 (.059)	.104 (.088)	.111 (.060)	.001 (.001)	-.001 (.001)		** .323 (.100)		4.31	5.43 (62)	.60
16-17 ($\bar{x}$= 40.4)	11.13	.386 (.319)	.004 (.170)	* .450 (.178)	.104 (.364)	-.436 (.814)	.189 (.584)	2.046 (1.31)	* .747 (.348)	-.014 (.179)	-.783 (1.04)	.787 (.599)	-.163 (.086)	-.217 (.128)	.095 (.087)	-.001 (.001)	-.001 (.001)	-.212 (.197)	* .327 (.148)		6.24	4.97 (61)	.59
18-19 ($\bar{x}$= 57.3)	42.12	.608 (.330)	.140 (.188)	.198 (.187)	-.456 (.382)	.145 (.848)	* 1.256 (.606)	.781 (1.36)	-.094 (.375)	.096 (.201)	-2.275 (1.09)	* 1.539 (.640)	* -.201 (.090)	-.260 (.133)	* .237 (.091)	.000 (.001)	.001 (.002)	** -.716 (.092)	.219 (.167)		6.51	9.59 (61)	.74
20-21 ($\bar{x}$= 71.1)	92.48	-.159 (.360)	* -.448 (.204)	-.166 (.204)	-.444 (.424)	-.451 (.928)	.761 (.664)	1.153 (1.50)	* -.912 (.407)	-.216 .210	-1.847 (1.20)	-1.046 (.672)	-.135 (.097)	** -.419 (.146)	* .233 (.099)	-.001 (.002)	-.000 (.002)	** -.560 (.061)	.050 (.194)		7.15	13.26 (61)	.80
22-24 ($\bar{x}$= 83.5)	29.41	** .693 (.250)	-.019 (.142)	.009 (.142)	-.154 (.290)	-.277 (.639)	* .945 (.459)	-.984 (1.05)	** 1.052 (.276)	.131 (.150)	-.290 (.854)	.089 (.466)	-.028 (.068)	-.067 (.102)	** .258 (.068)	.001 (.001)	* .003 (.001)	** -.616 (.069)	* .303 (.145)		4.94	13.76 (61)	.80
25-34 ($\bar{x}$= 93.3)	61.14	* .294 (.143)	-.047 (.080)	-.011 (.082)	-.039 (.166)	-.048 (.363)	** .705 (.266)	-.457 (.599)	** .436 (.159)	.124 (.086)	-.191 .481	.277 (.263)	-.004 (.039)	-.115 (.058)	** .106 (.039)	.001 (.001)	** .002 (.001)	** -.672 (.088)	.138 (.076)		2.84	11.04 (61)	.77
35-44 ($\bar{x}$= 95.3)	66.36	* .258 (.113)	-.006 (.061)	.008 (.063)	-.008 (.130)	.148 (.285)	* .435 (.208)	-.231 (.468)	* -.289 (.125)	.073 (.063)	-.394 (.368)	.158 (.207)	-.007 (.031)	** -.131 (.046)	.048 (.031)	.000 (.001)	** .002 (.001)		* .107 (.052)		2.24	6.42 (62)	.64
45-64 ($\bar{x}$= 88.1)	45.79	** .609 (.145)	.114 (.076)	* .174 (.083)	.027 (.168)	.584 (.372)	.231 (.268)	* -1.348 (.626)	-.090 (.160)	* .209 (.082)	-.314 (.477)	.270 (.265)	-.023 (.035)	-.065 (.056)	** .107 (.040)	.000 (.001)	.001 (.001)			** .273 (.066)	2.88	7.48 (62)	.67
65 and over ($\bar{x}$= 26.7)	-14.72	** 1.062 (.234)	.186 (.123)	.033 (.133)	-.050 (.271)	.359 (.598)	-.100 (.431)	.157 (1.01)	-.152 (.257)	** .357 (.132)	.548 (.768)	.467 (.427)	-.070 (.056)	.178 (.090)	* .156 (.064)	.001 (.001)	.001 (.001)			.173 (.106)	4.64	2.73 (62)	.43

*significant at the .05 level   **significant at the .01 level

Table 8

REGRESSION RESULTS FOR MALE COHORTS IN INTERMEDIATE COUNTIES

VARIABLES- Regression Coefficient (Standard Error) / Labor Force Participation Rates By AGE:	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)	Percent Urban	Population Per Square Mile	Male Median Earnings	Percent in School by Age	Pct. Males 20-49 with at least 4 yrs. High School	Pct. Males over 25 with at least 4 yrs. High School	Standard Error	F (d.f.)	R^2
14-15 ($\bar{x}$= 20.0)	16.90	.033 (.164)	.250 (.159)	.140 (.225)	-.102 (.321)	.561 (.665)	.706 (.453)	-3.319 (1.80)	.526 (.607)	.099 (.453)	-.106 (1.32)	.409 (.570)	** -.178 (.065)	-.198 (.112)	.010 (.074)	.043 (.126)	-.003 (.002)		.121 (.137)		8.09	2.04 (98)	.26
16-17 ($\bar{x}$= 37.3)	40.64	.239 (.183)	** .474 (.177)	.455 (.249)	.097 (.356)	.839 (.741)	.790 (.511)	-1.052 (2.01)	.960 (.674)	-.455 (.507)	-.732 (1.47)	.125 (.636)	* -.159 (.073)	-.186 (.126)	.089 (.082)	.139 (.140)	-.003 (.002)	-.198 (.161)	.111 (.159)		8.98	3.29 (97)	.8
18-19 ($\bar{x}$= 57.2)	12.45	** .625 (.223)	.212 (.218)	* .811 (.312)	.170 (.438)	-.461 (.907)	* 1.282 (.617)	.888 (2.46)	* 1.888 (.837)	.821 (.622)	.243 (1.81)	.746 (.779)	-.150 (.090)	-.225 (.155)	.081 (.100)	-.171 (.174)	.002 (.002)	** -.398 (.086)	.004 (.201)		11.01	6.24 (97)	.54
20-21 ($\bar{x}$= 75.2)	36.63	.505 (.324)	* .738 (.297)	* 1.066 (.432)	-.230 (.601)	2.280 (1.25)	.399 (.862)	-.751 (3.37)	1.593 (1.16)	-.558 (.865)	2.008 (2.60)	1.120 (1.06)	-.061 (.124)	-.180 (.215)	.256 (.137)	-.261 (.238)	-.002 (.003)	* -.292 (.113)	.085 (.272)		15.10	3.51 (97)	.39
22-24 ($\bar{x}$= 84.9)	33.11	** .562 (.177)	** .739 (.180)	** .700 (.250)	.601 (.344)	1.052 (.716)	.807 (.491)	1.788 (1.94)	* 1.470 (.677)	-.932 (.501)	.267 (1.43)	.221 (.614)	.107 (.070)	.127 (.122)	.000 (.080)	-.136 (.147)	-.001 (.002)	* -.237 (.094)	.214 (.158)		8.68	7.54 (97)	.58
25-34 ($\bar{x}$= 92.6)	43.63	** .380 (.092)	** .433 (.087)	* .292 (.125)	.245 (.176)	* .903 (.365)	** .736 (.248)	1.778 (.981)	.532 (.336)	-.485 (.259)	-.220 (.720)	.471 (.310)	* .085 (.036)	.069 (.062)	.011 (.040)	-.032 (.070)	.001 (.001)	** -.381 (.145)	** .378 (.081)		4.40	11.77 (97)	.69
35-44 ($\bar{x}$= 93.8)	56.42	** .346 (.084)	** .415 (.081)	* .265 (.115)	.268 (.164)	* .674 (.340)	** .639 (.232)	* 2.240 (.923)	-.354 (.310)	.272 (.232)	.251 (.677)	.520 (.291)	.026 (.033)	-.016 (.058)	.023 (.038)	.051 (.064)	-.001 (.001)		** .243 (.070)		4.14	9.05 (98)	.61
45-64 ($\bar{x}$= 86.7)	39.37	** .645 (.074)	** .453 (.072)	** .381 (.103)	** .603 (.144)	* .674 (.297)	* .435 (.210)	.066 (.802)	-.434 (.272)	** .592 (.206)	* 1.269 (.589)	.313 (.257)	.010 (.028)	-.042 (.046)	.027 (.033)	* .139 (.057)	.000 (.001)			** .228 (.071)	3.66	20.01 (98)	.78
65 and over ($\bar{x}$= 28.9)	-7.95	** .691 (.119)	** .412 (.114)	.076 (.163)	.324 (.229)	-.002 (.470)	.520 (.333)	-.519 (1.27)	-.801 (.430)	.425 (.326)	.698 (.938)	-.513 (.407)	.045 (.045)	.085 (.072)	* .112 (.053)	.046 (.091)	-.001 (.001)			* .287 (.111)	5.79	8.92 (98)	.61

*significant at the .05 level   **significant at the .01 level

Table 9

REGRESSION RESULTS FOR MALE COHORTS IN SMALL COUNTIES

VARIABLES- Regression Coefficient (Standard Error) / Labor Force Partici- pation Rates By AGE:	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)		Population Per Square Mile	Male Median Earnings	Percent in School by Age	Pct. Males 20-49 with at least 4 yrs. High School	Pct. Males over 25 with at least 4 yrs. High School	Standard Error	F (d.f.)	R^2
14-15 ($\bar{x}$= 18.3)	-32.34	** .615 (.156)	.394 (.205)	.730 (.381)	.691 (.527)	.166 (.839)	.641 (.522)	1.278 (1.79)	.232 (.576)	.377 (.572)	1.056 (2.47)	.825 (.528)	-.005 (.079)	-.010 (.108)		.347 (.246)	.001 (.002)		.019 (.127)		9.11	2.38 (106)	.26
16-17 ($\bar{x}$= 32.9)	-10.61	** .561 (.199)	** 1.127 (.262)	* 1.030 (.485)	-.261 (.671)	1.546 (1.07)	** 3.008 (.671)	2.329 (2.27)	-.656 (.759)	1.362 (.729)	3.290 (3.14)	.317 (.674)	-.174 (.101)	-.095 (.138)		-.061 (.314)	-.003 (.002)	.012 (.148)	-.153 (.162)		11.57	4.13 (105)	.40
18-19 ($\bar{x}$= 55.9)	-22.41	** 1.096 (.243)	* .752 (.320)	* 1.465 (.592)	** 2.803 (.820)	1.249 (1.309)	** 3.938 (.811)	-.136 (2.80)	.570 (.913)	** 3.312 (.889)	-3.898 (3.95)	* 1.839 (.821)	-.049 (.124)	* -.385 (.170)		.607 (.383)	-.003 (.002)	* -.234 (.095)	-.270 (2.00)		14.15	6.08 (105)	.49
20-21 ($\bar{x}$= 78.5)	1.52	** .944 (.273)	.253 (.355)	1.296 (.661)	1.235 (.910)	.948 (1.47)	.663 (.920)	1.694 (3.10)	.701 (.998)	1.519 (1.00)	-.624 (4.44)	.604 (.913)	.243 (.137)	-.232 (.189)		-.262 (.425)	.002 (.003)	* -.265 (.118)	.113 (.227)		15.71	2.34 (105)	.27
22-24 ($\bar{x}$= 90.4)	58.61	** .520 (.123)	-.008 (.163)	.431 (.300)	** 1.214 (.415)	.155 (.664)	-.151 (.413)	1.553 (1.41)	.455 (.455)	.451 (.461)	-.384 (1.96)	.325 (.415)	.020 (.062)	** -.292 (.086)		-.379 (.196)	.0001 (.001)	-.029 (.122)	.083 (.101)		7.16	6.38 (105)	.51
25-34 ($\bar{x}$= 94.1)	69.53	** .264 (.068)	** .323 (.090)	.132 (.166)	.280 (.230)	.339 (.367)	.147 (.227)	1.506 (.783)	.055 (.251)	.357 (.256)	1.169 (1.08)	.415 (.230)	** -.095 (.035)	** -.160 (.048)		.152 (.109)	-.001 (.001)	-.241 (.171)	* .141 (.056)		3.96	9.01 (105)	.59
35-44 ($\bar{x}$= 94.2)	66.92	** .373 (.079)	** .411 (.103)	.338 (.191)	.379 (.265)	.466 (.422)	.304 (.262)	1.000 (.899)	.082 (.290)	.438 (.288)	-.299 (1.24)	.315 (.266)	* -.102 (.040)	-.106 (.055)		.224 (.124)	-.001 (.001)		.048 (.064)		4.58	8.38 (106)	.56
45-64 ($\bar{x}$= 87.1)	50.85	** .575 (.061)	** .480 (.083)	** .534 (.152)	.380 (.204)	.462 (.326)	.258 (.202)	-.015 (.694)	** .803 (.231)	.375 (.224)	.704 (.955)	.319 (.205)	** -.128 (.030)	** -.176 (.041)		.069 (.095)	-.001 (.001)			* .124 (.057)	3.53	28.86 (106)	.81
65 and over ($\bar{x}$= 31.8)	-27.62	** .776 (.118)	** .527 (.160)	.555 (.291)	.435 (.391)	1.220 (.625)	.430 (.386)	.923 (1.33)	** 1.504 (.442)	** 1.455 (.430)	.238 (1.83)	.204 (.392)	.041 (.057)	-.063 (.078)		.019 (.183)	.000 (.001)			.034 (.109)	6.77	6.86 (106)	.51

*significant at the .05 level **significant at the .01 level

had the most consistently positive effect of any industry on labor force participation rates. Increased employment opportunities in agriculture increased the labor force participation rates of most of the cohorts analyzed; this was the case for each of the nine age groups in small counties, and six of the age cohorts in each of the other two county size groups. Thus, even though agriculture represents a small proportion of the total employment opportunities in the region it was certainly the industry most often significantly related to the participation rates of males. Following agriculture as the most consistent industrial determinants of labor force participation rates were construction-mining with 14 statistically significant coefficients and manufacturing with 11 statistically significant coefficients.

Examination of the pattern of significant coefficients among the three county size groups reveals considerable differences in the number of statistically significant coefficients across the three size groups for four of the ten industrial categories. The construction-mining variable has seven significant coefficients for men in intermediate counties and six significant coefficients for the small county cohorts, compared with only one significant coefficient for men in large counties. An increase in (expected) opportunities for men in manufacturing resulted in higher labor force participation rates for six of the nine cohorts in intermediate counties, compared with only two and three of the cohorts in large and small counties, respectively. Increased relative employment opportunities for men in wholesale trade in a particular county were associated with higher labor force participation rates for three of the age cohorts in intermediate counties but for none of the age groups in

either of the other size categories. Finally, the services EOI variable had five significant coefficients for males in large counties but only two significant coefficients in each of the other size categories. Otherwise, for the significant coefficients, the impact of variations in the employment opportunities available to males in a particular industry had fairly similar effects across the county size groups in significantly increasing male labor force participation rates.

Another difference among the county size groups, and one quite unexpected, is not reflected by the summary provided in Table 6. Examination of the regression coefficients reported in Tables 7, 8, and 9 reveals that seven of the 22 statistically significant coefficients estimated for males in large counties actually have negative signs. Moreover, four of these seven negative coefficients were for the services industry variable. The explanation for these findings is not apparent. In contrast, none of the 58 statistically significant coefficients for the industry EOI variables has a negative sign in the equations for the other two county size groups. The appearance in the regression equations of the seven negative and statistically significant regression coefficients (out of a total of 540 estimated for men and women together), however, does not seem to provide a valid basis for questioning the theoretically plausible positive coefficients expected for the EOI variables.

Increases in the industry EOI variables affect labor force participation rates for the various age cohorts in somewhat different ways in each of the three county size categories. The information presented in Table 10 summarizes this pattern for the statistically significant coefficients with positive signs for the age cohorts, classified by

Table 10

NUMBER OF POSITIVE AND STATISTICALLY SIGNIFICANT COEFFICIENTS ESTIMATED FOR RELATIVE INDUSTRY EMPLOYMENT OPPORTUNITY INDEXES FOR MALE COHORTS[a]

Age Group	Large Counties	Intermediate Counties	Small Counties	Total
14-15	1	0	1	2
16-17	2	1	4	7
18-19	1	4	6	11
20-21	0	2	1	3
22-24	2	4	2	8
25-34	2	5	2	9
35-44	2	6	2	10
45-64	3	8	4	15
65 & over	2	2	4	8
TOTALS	15	32	26	73

[a] See Tables 7, 8, and 9 for the detailed regression results for large, intermediate, and small counties, respectively.

county size group. Increases in the employment opportunities available to males (of all ages) seldom increased the labor force participation rates of persons in the groups which contain most high school students (ages 14-19) in large or intermediate counties; only four and five out of a possible 30 coefficients were statistically significant for young workers in these respective size groups. In contrast, 11 of the coefficients estimated for the industry variables were statistically significant for the three youngest age groups in small counties. As might be expected, increased employment opportunities for males of all ages may be more likely to attract school age males into the labor force in small, rural counties than in counties with some degree of urbanization. The other age cohorts most often affected by increased employment opportunities in these small counties were the two oldest ones (45-64 years, and 65

years and up), for which four significant coefficients were estimated in each case, again perhaps reflecting the rural nature of these counties. In intermediate counties, increased employment opportunities most frequently had an effect on workers in the four prime-age categories, from 22 to 64 years of age; within these four age groups the impact was most pronounced for the 45-64 age group (with eight of a possible ten coefficients statistically significant). Within large counties, no distinct pattern emerges for the various age groups, except that only a total of two coefficients are statistically significant for the 14-15, 18-19, and 20-21 year old age groups combined.

The Unemployment Rate. Increases in the unemployment rate had little effect on the labor force participation rates of men, similar to the regression results presented earlier for the female cohorts. Only two statistically significant coefficients were estimated for this variable, one for 18-19 year old males in large counties and one for this same age group in small counties. In each case, the coefficient is positive, which indicates the dominance of the additional worker over the discouraged worker effect for this age group. Moreover, if statistically non-significant coefficients are also considered, 24 of the 27 coefficients estimated have positive signs. Thus, as was the case for females, the results provide very little indication that "hidden" unemployment (as measured in this study) existed in the region in 1970. The qualifications noted for women, however, should be reiterated. First, this was a period of strong economic activity, as indicated by average unemployment rates of 4.8 percent, 4.4 percent, and 3.9 percent for large, intermediate, and small counties, respectively. Hidden unemploy-

ment is much less likely to be a problem when economy activity levels are high than when they are low. Also, controlling for the influence of industrial employment opportunities on labor force participation rates very likely reduces the estimated residual effect of the unemployment rate. Finally, it should be noted that hidden unemployment is much less likely to exist for prime-age males than for females under any reasonable range of economic activity. The prime-age male labor force simply is not as responsive to changing economic conditions as is the female labor force; an indication of this was also provided by the considerably smaller size of the statistically significant coefficients for the industrial employment opportunity index variables in the equations for males than in the equations for females.

Ethnic Composition. Eight of the coefficients estimated for the percent Spanish variable had statistically significant coefficients. Two of these coefficients were for age groups in large counties, whereas the other six were evenly divided between intermediate and small counties. In all but one of the cases, the sign of these statistically significant coefficients is negative and four of these seven negative coefficients were for workers under 19 years of age. These results thus provide some support for the hypothesis that labor market discrimination may in some cases depress the labor force participation rates of Spanish workers, especially those in the youngest age groups.

The other ethnic measure included was the percentage of males in each county accounted for by Indian persons. Six of the coefficients for this variable -- two for cohorts in large counties and four for cohorts in small counties -- have statistically significant coefficients

and each of these coefficients has a negative sign. Thus, as would be expected, counties in which Indian males comprise larger proportions of the male population tend to have somewhat lower participation rates than otherwise similar counties, at least for some age cohorts.

Urbanization and Density. For a given population density, increased urbanization was associated with (significantly) increased labor force participation rates for six of the seven male cohorts over 18 years of age in large counties, whereas this was the case for only one of these cohorts in intermediate counties. Apparently, increased urbanization, even controlling for the relative level of industrial employment opportunities, induces stronger labor market attachment, at least in large counties. A 1 percent increase in urbanization was associated with increases in labor force participation rates of about .11 to .26 percent in the cases where statistically significant coefficients were estimated. In contrast, variations in population density had a statistically significant effect on the labor force participation rates of only one of the twenty-seven groups in the three county size categories.

Median Earnings. Higher median earnings had little effect on the labor force participation rates of males in this region. Only three of the 27 coefficients estimated for this variable are statistically significant -- for the three groups in the 22-44 age range in large counties -- and each of these coefficients has a positive sign (see Tables 7, 8, and 9). Thus, for these three age groups, the substitution effect of higher earnings apparently dominated the income effect. For the remaining 24 cohorts, however, the substitution and income effects were approximately offsetting, so that statistically nonsignificant coefficients resulted.

Educational Variables. Ten of the 15 age cohorts (in the age range 16-34 years for the three county size categories) for which the percentage enrolled in school variable was utilized had statistically significant and negative coefficients for this variable. Thus, as would be expected, increased school enrollment tended to reduce labor force participation rates for most cohorts. This was the case for all the cohorts in 18-34 years range in large and intermediate counties, as well as for workers in the 18-19 and 20-21 year cohorts in small counties.

One of two educational variables -- the percent of males 20-49 years with at least 4 years of high school (for the 14-44 year age cohorts) and the percent of males over 25 years with at least 4 years of high school (for the two oldest cohorts) was included in each equation. Nine of the ten statistically significant coefficients estimated were for workers in large or intermediate counties (see Tables 7, 8, and 9). In each case, these statistically significant coefficients have positive signs, consistent with the expected relationship. Interestingly, statistically significant coefficients were estimated for the education variables for five of the six age cohorts over 35 years of age in intermediate and large counties. Thus, at least for these older workers in urbanized areas, increased educational attainment tended to increase labor force participation rates, as hypothesized.

Conclusions

The purpose of this study was to investigate the relationship between county-level labor force participation rates and a number of theoretically relevant economic and demographic characteristics of the workers within the nine-state region encompassed by the Four Corners and Old West Regional Commissions. Emphasis was placed on estimating the influence of the industrial composition of employment on the patterns of labor force participation of 18 population cohorts, classified by age and sex, within three county size groups.

The empirical results of this analysis, based on 1970 census data, provide support for the hypothesis that greater industry-specific relative employment opportunities for a particular sex (the EOI variables) tend to increase the labor force participation rates recorded for workers of that sex. An equal number (73) of positive and statistically significant coefficients for these variables was estimated for the male and female cohort groups. In some instances, however, these variables exerted quite different effects on the participation decisions of males and females. For example, relative employment opportunities in the agricultural sector were significantly related to the labor force participation rates of males in 21 of the 27 age-county size cohorts, compared with a total of only six for the female cohorts. Similarly, relative employment opportunities in construction and mining were estimated to significantly influence the labor force participation decisions of 14 of the male cohorts, but only five of the female cohorts. In contrast, increased relative employment opportunities in the services industry were more often significantly related to increased labor force participation of the female cohorts (a total of 16),

compared with the male cohorts (a total of five). For many of the other industrial categories, however, the number of statistically significant coefficients for the industry-specific EOI variables were quite similar in the equations estimated for males and females (e.g., manufacturing and retail trade). The importance of the industrial composition of employment variables was quite similar among the three county-size categories analyzed. The total number of statistically significant EOI variables for men and women combined was 47, 57, and 49, for large, intermediate, and small counties, respectively. The analysis further revealed that the influence of the EOI variables was generally stronger on the labor force participation decisions of the prime-aged components of the female population, and of somewhat greater importance for the younger and older male age cohorts, especially in small counties. Overall, a general conclusion to be drawn from this analysis is that relative employment opportunities, classified by industry, exert important influences on the labor force participation decisions of a large number of the sex-age cohorts within the nine-state region. It should also be emphasized, however, that the impact of greater relative employment opportunities in a particular industry in increasing labor force participation rates is quite selective -- in most cases, greater opportunities had no significant effect on labor force participation rates and in a few cases the impact was actually negative.

A second objective of this study was to investigate the presence (or absence) of "hidden" unemployment at the county level. The existence of "hidden" unemployment is identified in this study by a negative and statistically significant coefficient estimated for the unemployment rate variable which appears in each of the 54 equations. By this measure, the

empirical findings strongly support the conclusion that very little "hidden" unemployment existed in the region in 1970 -- a negative and statistically significant regression coefficient was found in only one equation out of the 54 estimated. Perhaps this finding is not surprising because "hidden" unemployment is not typically a problem during periods of relatively strong economic activity, as reflected by the relatively low average unemployment rates which prevailed in the region during 1970.

The relationship between labor force participation rates and several other potentially relevant economic and demographic characteristics of the region's population also was investigated in this study. The empirical findings support many of the relationships hypothesized for these variables. For example, the results indicate that married women with husbands present tended to have lower labor force participation rates than otherwise similar females. Similarly, male age cohorts in counties with larger percentages of the age cohort enrolled in school tended to have lower participation rates than males in the same age cohorts in other counties; interestingly, this expected pattern did not hold for females. The ethnic composition variables, those that measure the extent of urbanization (and population density) among counties, and those that measure county earnings levels also were significantly related to the labor force participation rates recorded for a number of the cohort groups analyzed. Although the results for these variables are not always similar among the 54 equations estimated, the results indicate that a number of these economic and demographic variables also are important determinants of labor force participation choices made by persons in the region.

Footnotes

* The authors gratefully acknowledge the contributions of Professor Michael Greenwood and Mr. Ronald Madsen. Professor Greenwood provided valuable assistance in the formulation of the general model; his contribution to the appropriate specification of the industrial-composition-of-employment portion of the model was especially useful in improving the analysis. Mr. Madsen provided extremely valuable assistance in collecting the original data, constructing the computer tapes, developing the general model and processing the numerous alternative specifications estimated. The authors also appreciate the contributions of Professor James Chalmers who provided several useful suggestions during the study.

[1] The Four Corners states are Arizona, Colorado, New Mexico, and Utah; the Old West states are Nebraska, North Dakota, South Dakota, Montana and Wyoming.

[2] The age groupings for the two sex categories are those available from the 1970 Census: 14-15 years, 16-17 years, 18-19 years, 20-21 years, 22-24 years, 25-34 years, 35-44 years, 45-64 years and 65 years and up.

[3] Other aspects of labor supply include the number of hours worked by each employed labor force member and the level of skill, education, experience, and productivity possessed by the worker.

[4] The specific counties included in each size category are listed, by state, in Appendix A.

[5] Mincer, for example, has noted that cross-sectional estimates of the responsiveness of labor force size to changes in economic activity levels may overstate the "true" intertemporal effects of such changes in the aggregate. See J. Mincer, "Labor Force Participation and Unemployment: A Review of Recent Evidence," in J. F. Burton, et. al., Readings in Labor Market Analysis, New York: Holt, Rinehart and Winston, 1970, p. 84.

[6] It should be noted, however, that even if the required time series data were available, the statistical problems associated with time series analyses of labor force participation behavior are almost as formidable as those encountered in using cross-sectional data for time series approximations. See Mincer, op. cit., p. 92.

[7] It should be emphasized that a number of different measures of the particular determinants of labor force participation emphasized in this analysis are oftentimes available from the county census data. For example, several measures of educational attainment, ethnic composition and earnings (or income) levels are available. As a result, a substantial amount of experimentation was required for this analysis before the specific set of variables was selected for inclusion in the model. Inclusion of multiple measures of a particular influence was not appropriate because of the high levels of correlation among them, which would

have reduced the estimated level of statistical significance of each in the regression equations. The hypotheses developed in this section of the paper indicate the expected relationships between labor force participation rates and specific measures selected to represent the influence of theoretically relevant variables. If alternative measures of these influences had been selected for inclusion in the analysis in place of those actually selected, the hypothesized relationships would not be appreciably altered.

[8] W. Bowen and A. Finegan, The Economics of Labor Force Participation, Princeton: Princeton University Press, 1969, Appendix B.

[9] L. Blair, "An Analysis of Utah Labor Force Participation," (unpublished paper prepared for the Office of the State Planning Coordinator by the Bureau of Business and Economic Research, University of Utah, 1973).

[10] This assumption is required for the analysis because the only observations available on industry employment by sex (at the county level) are those contained in the 1970 Census. Although the sex ratio of employment by industry obviously is not invariant through time, it seems likely that these industry ratios would be fairly stable, at least over reasonably short intervals.

[11] Ideally, the level of job vacancies by industry also would be included in constructing the employment opportunity indexes, but job vacancy data are not available.

[12] This approach is consistent with the methodology employed by Bowen and Finegan, although in their analysis a wider age range was used for most cohorts. Preliminary experimentation in this analysis with a population variable which is both sex and age specific reinforced the decision to allow for such substitutions among the age cohorts.

[13] Ibid., pp. 80-90.

[14] Actually, the revealed differences in labor supply elasticities of persons in these two groups arises in part precisely because of the greater scope for substitution between market and nonmarket activities among the "hidden" component of the unemployed group. As a result, the net gain to individuals and to society from a movement into labor force status should be less for the "hidden" unemployed than for their "measured" counterpart. Indeed, as Mincer notes, it is somewhat paradoxical that the greater are the attempts to optimize the timing of labor force participation by the population cohorts, the greater is the apparent existence of "hidden" unemployment in the economy. See Mincer, Ibid., pp. 100-101, on this point.

[15] For an analysis of the relationship between the size of the labor force and economic activity levels based on this type of data, see W. Lee Hansen, "The Cyclical Sensitivity of the Labor Supply," American Economic Review, 51, (June, 1961) pp. 299-309.

[16] If the dependent variable in the analysis had been the overall county labor force participation rate, or if broader age ranges had been used for the cohorts, the ratio of total unemployment divided by total population might well have been a more appropriate measure than the total unemployment rate, which is defined as total unemployment divided by the total labor force. See Mincer, op. cit., p. 83 on this point.

[17] A basic assumption of this phase of the analysis is that the effects on labor force participation rates of a 1 per cent unemployment rate differential across counties will provide a useful approximation of the impact of a 1 percent rise in the unemployment rate in one or more counties over time on the labor force participation rate in those counties. As noted above, some conceptual difficulties may arise in using cross-sectional data to estimate time-series responses. At the county level, however, no time series data are available from which an alternative set of estimates could be developed.

[18] Bowen and Finegan, op. cit., pp. 50-51.

[19] This is not so much the case in explaining labor force participation rate differences between white and Negro women as it is for such differences between white and other nonwhite women. See ibid., pp. 89-95.

[20] Even with the pair-wise combination of states employed in the analysis, in some instances these dummy variables were not permitted to enter the regression equations because of the absence of a sufficient number of degrees of freedom.

[21] The maximum number of significant coefficients possible for these variables is: 5 for the percent-in-school-by-age variable; 2 for the percent of females 15-44 years with at least 4 years of high school education variable; 2 for the percent female over 25 years with at least a high school education variable; and 8 for the percent married with husband present variable. It should also be noted that the percent urban variable could not enter the equations for small counties, since this variable is defined to be zero for all small counties.

[22] The R^2 values for the equations reported in each of the tables for men and women have not been adjusted for differences in degrees of freedom among them. Nonetheless, the overall patterns of the "explanatory power" of the equations estimated for the different county size groups described in the text are accurate generalizations for adjusted values of R^2.

[23] As emphasized above, the EOI variables are based on the assumption that the relative sex-employment opportunities in any particular county and industry depend only on the sex-employment ratio for all counties in the relevant county size group, the actual level of employment in that county and industry, and the number of women of labor force age in that county.

[24] The maximum number of significant coefficients possible for these variables is: 5 for the percent-in-school-by-age variable; 7 for the percent of males 20-49 years with at least 4 years of high school education variable and 2 for the percent of males over 25 years with at least 4 years of high school education variable. The percent urban variable was not included in the equations for the small county group because it is defined to be zero for all small counties.

APPENDIX A

COUNTIES INCLUDED IN EACH COUNTY SIZE CATEGORY, BY STATE

LARGE COUNTIES

Arizona

Cochise
Coconino
Maricopa
Pima
Pinal
Yavapai
Yuma

Colorado

Adams
Arapahoe
Boulder
Denver
El Paso
Jefferson
La Plata
Larimee
Logan
Mesa
Pueblo
Weld

Montana

Cascade
Flathead
Gallatin
Hill
Lewis & Clark
Missoula
Silver Bow
Yellowstone

Nebraska

Adams
Buffalo
Dodge
Douglas
Gage
Hall
Lancaster
Lincoln
Madison
Platte
Sarpy
Scotts Bluff

New Mexico

Bernalillo
Chaves
Curry
Dona Ana
Eddy
Lea
Los Alamos
McKinley
Otero
Roosevelt
San Juan
Sante Fe

North Dakota

Burleigh
Cass
Grand Forks
Morton
Stark
Stutsman
Ward
Williams

South Dakota

Beadle
Brookings
Brown
Codington
Davison
Lincoln
Minehaha
Pennington
Yankton

Utah

Box Elder
Cache
Davis
Salt Lake
Toode
Utah
Weber

Wyoming

Albany
Laramie
Natrona
Sheridan
Sweetwater

INTERMEDIATE COUNTIES

Arizona

Gila
Graham
Greenlee
Mohave
Navajo
Santa Cruz

Colorado

Alamosa
Bent
Chaffee
Delta
Fremont
Garfield
Gunnison
Huerfano
Kit Carson
Lake
Las Animas
Moffat
Montezuma
Montrose
Morgan
Otero
Prowers
Rio Grande

Montana

Beaverhead
Big Horn
Custer
Dawson
Deer Lodge
Fergus
Glacier
Lincoln
Park
Pondera
Powell
Richland
Roosevelt
Valley

Nebraska

Box Butte
Cass
Cherry
Cheyenne
Colfax
Cuming
Custer
Dakota
Dawes
Dawson
Hamilton
Holt
Jefferson
Kearney
Keith
Kimball
Merrick
Nuckolls
Otoe
Phelps
Red Willow
Richardson
Saline
Saunders
Seward
Washington
Wayne
York

New Mexico

Colfax
Grant
Hidalgo
Luna
Quay
Rio Arriba
San Miguel
Sierra
Socorro
Union
Valencia

North Dakota

Barnes
Bottineau
Pierce
Ramsey
Richland
Traill
Walsh

South Dakota

Butte
Clay
Fall River
Grant
Hughes
Lake
Lawrence
Meade
Roberts
Shannon
Spink
Tripp
Union
Walworth

Utah

Carson
Grand
Iron
Juab
Sevier
Uintah
Wasatch
Washington

Wyoming

Campbell
Carbon
Converse
Fremont
Goshen
Johnson
Park
Uinta
Washakle
Weston

SMALL COUNTIES

Arizona

Apache

Colorado

Clear Creek
Conejos
Douglas
Eagle
Pitkin
Rio Blanco
Routt
Saguache
Washington
Yuma

Montana

Blaine
Carbon
Chouteau
Jefferson
Lake
McCone
Madison
Phillips
Powder River
Ravalli
Rosebud
Sanders
Sheridan
Stillwater

Nebraska

Antelope
Boone
Boyd
Burt
Butler
Cedar
Chase
Clay
Dixon
Fillmore
Franklin
Frontier
Furnas
Greeley

Nebraska (cont.)

Harlan
Hitchcock
Johnson
Knox
Morrill
Perkins
Pierce
Polk
Sheridan
Stanton
Thayer
Thurston
Valley
Webster

New Mexico

Guadalupe
Lincoln
Mora
Sandoval
Taos
Torrance

North Dakota

Adams
Benson
Cavalier
Divide
Dunn
Emmons
Kidder
La Moure
McHenry
McKenzie
McLean
Mercer
Mountrail
Nelson
Pembina
Ransom
Rolette
Sargent
Steele
Towner
Wells

South Dakota

Bennett
Bon Homme
Campbell
Charles Mix
Clark
Corson
Custer
Day
Devel
Dewey
Douglas
Edmunds
Gregory
Hamlin
Hand
Hutchinson
Jerauld
Kingsbury
Lyman
McCook
McPherson
Marshall
Mellette
Miner
Moody
Perkins
Potter
Stanley
Todd
Turner

Utah

Beaver
Duchesne
Emery
Millard
Morgan
San Juan
Sanpete

Wyoming

Big Horn
Crook
Lincoln
Platte
Sublette
Teton

APPENDIX B

Aggregation of Census Industrial Employment Groups

Industry Group for Study	1970 Census Industrial Classification
1. Agriculture	. Agriculture
2. Construction and Mining	. Construction . Mining
3. Manufacturing	. Manufacturing
4. Transportation and Communication	. Railroads and Railway Express . Trucking Services and Warehousing . Other Transportation . Communications . Utilities and Sanitary Services
5. Wholesale Trade	. Wholesale Trade
6. Retail Trade	. Food, Bakery, and Dairy Stores . Eating and Drinking Places . General Merchandise Retailing . Motor Vehicle Retailing and Service Stations . Other Retail Trade
7. Banking, Finance, and Insurance	. Banking and Credit Agencies . Insurance, Real Estate, and Other Finance
8. Services	. Business and Repair Services . Private Households . Other Personal Services . Entertainment and Recreation Services . Hospitals . Health Services, Except Hospitals . Legal, Engineering, and Misc. Professional Services . Welfare, Religious, and Other Nonprofit Organizations
9. Government	. Public Administration . Elementary, Secondary Schools and Colleges--Public
10. Other Education	. Elementary, Secondary Schools and Colleges--Private . Other Education and Kindred Services

APPENDIX C

Regional Relative Employment Opportunities Index, By County Size, Sex, and Industry (In Percentages)

	LARGE COUNTIES		INTERMEDIATE COUNTIES		SMALL COUNTIES	
	Male	Female	Male	Female	Male	Female
1. Agriculture	90.03	9.97	93.77	6.23	93.86	6.14
2. Construction and Mining	93.19	6.81	96.09	3.91	96.62	3.38
3. Manufacturing	73.36	26.64	75.30	24.70	72.41	27.59
4. Transportation & Communication	78.27	21.73	83.81	16.19	86.19	13.81
5. Wholesale Trade	78.96	21.04	81.38	18.62	81.81	18.19
6. Retail Trade	54.90	45.10	55.58	46.42	54.54	45.46
7. Banking, Finance and Insurance	51.10	48.90	48.42	51.58	52.82	47.18
8. Services	42.13	57.87	36.84	63.16	36.48	63.52
9. Government	56.40	43.60	52.09	47.91	48.75	51.25
10. Other Education	38.51	61.49	35.66	64.34	32.99	67.01

APPENDIX D

Example Values and Units of Measurement of Variables Analyzed[a]

Example Value	Variable Name and Units of Measurement
86.5	Labor Force participation rate (in percentage points) by age and sex.
4.6	Unemployment rate (in percentage points), expressed as: $\frac{\text{Unemployed Civilian Labor Force}}{\text{Total Civilian Labor Force}} \times 100.$
7.496	Industry employment opportunities variable, by sex, given by: $\left[\frac{E_{il}}{E_l}\right]_S \cdot \left[\frac{E_{lk}}{POP_{ik}}\right]$ where each term is as defined in the text of the paper. The regional-index value (the left-hand term) is measured in percentage points and the county-specific values of the right-hand term are expressed as a ratio. The product of these two terms was multiplied by 100. The example value of 7.496 could have resulted from the following calculations for males employed in agriculture in a given county-size category: Regional Index (the left-hand term) = 50.0% County-specific ratio = .14992 The product of these two terms, multiplied by 100, yields: 50.0% x .14992 x 100 = 7.496
46.1	Percent urban, defined as: $\frac{\text{Population living in a city of at least 2500}}{\text{Total County Population}} \times 100$
11.6	Population per square mile, defined as: $\frac{\text{Population}}{\text{Square Miles}}$
17.8	Percent Spanish defined as: $\frac{\text{Population of Spanish Language}}{\text{Total County Population}} \times 100$
7.6	Percent American Indian (by Sex), defined as: $\frac{\text{American Indian Population by Sex}}{\text{Total County Population by Sex}} \times 100$

Example Value	Variable Name and Units of Measurement
7238.	Median earnings in 1969 of males or females 16 years or older with labor force experience.
93.6	Percentage of persons in a particular age cohort (e.g., 16-17 years) enrolled in school.
66.5	Percentage of males (aged 20-49 years) or females (aged 15-44 years) with at least 4 years of high school.
55.0	Percentage of males or females aged 25 years or more with at least 4 years of high school.
55.2	Percentage of women aged 16 years or more married with husband present.
1.0	Pair-wise state dummy variables, defined to have a value of 1 or zero depending on whether or not the individual county is located in a particular pair of states (defined in the text).

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[a] All variables are county-specific, unless otherwise noted.

APPENDIX E

Interim Report Equations

One purpose of this study was to develop a set of labor force participation rate equations that would be of use to individuals involved in the development of the state-wide simulation models within the nine-state region. A number of specifications of the basic model were attempted, some of which focused primarily on the estimation of labor force participation equations constructed with variables generally believed to be endogenous to the models under construction. In these specifications, certain variables included in the equations reported in the text were excluded from consideration (e.g., family status, percent enrolled in school, etc.). The equations which utilized the restricted set of variables also differ from those reported in the text in that stepwise multiple regression techniques were employed in the estimation of these equations. Differing levels of priority were established for the potential inclusion of different variable sets. Because of the emphasis placed on the relationship between the industrial composition of employment and labor force participation behavior within the modeling context, the industrial composition of employment variables (see equation 2 in the text) were given the highest priority for inclusion in the model, followed by the unemployment rate, urbanization variables, ethnic variables and the state dummy variables.

The results of this analysis were provided to the modeling groups in the Interim Report for this project. Those same equations are presented in this appendix, together with an alternative specification

requested by one of the modeling groups. This second specification included the same explanatory variables as those contained in the Interim Report equations; in this version, all of the industrial composition of employment variables were forced into each equation, but stepwise regression was utilized for the remaining independent variables.

Table 11

STEPWISE REGRESSION RESULTS FOR FEMALES IN LARGE COUNTIES

Variables-Regression Coefficient (Standard Error) / Labor Force Participation Rates by:	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)		Percent Urban	Percent in Cities of 10,000 or More	Population Per Square Mile	Az.-New Mexico (dummy)	NDakota-SDakota (dummy)	Colorado-Utah (dummy)	Wyo-Montana (dummy)	Standard Error	F (d.f.)	R^2
14-15 (X=11.31)	17.42	1.629** (.571)										-.610* (.265)	.022 (.060)				-.038 (.015)		-4.325* (1.76)		-3.750** (1.22)		4.03	7.62 (73)	.39
16-17 (X=27.45)	38.31	3.04** (1.11)	-2.211 (1.50)			-1.285 (1.74)	.809** (.236)					-1.967** (.460)	.077 (.079)	-.138 (.080)					-6.704** (2.50)		-5.764** (1.56)		5.10	11.06 (70)	.59
18-19 (X=46.79)	49.04				3.273* (1.54)	9.235** (2.55)	-.877** (.271)					-1.315* (.640)		-.176 (.112)					-5.142* (2.28)				7.56	11.36 (73)	.48
20-21 (X=53.89)	59.66		-3.913 (2.14)			9.309** (2.06)			-.170 (.117)			-1.333* (.598)							-8.277** (2.45)		-4.830* (2.15)		7.68	12.80 (73)	.51
22-24 (X=51.81)	52.55	-3.135** (.983)	-9.863** (1.64)			3.908 (2.47)		2.046 (1.03)															6.38	15.66 (75)	.46
25-34 (X=42.38)	38.56		-2.040 (1.21)				-.333* (.146)	2.531** (.642)									.037* (.016)						4.42	8.47 (75)	.31
35-44 (X=48.49)	50.35																	.001 (.0008)	-5.199** (1.26)	-3.835** (1.315)			4.57	8.44 (76)	.25
45-64 (X=46.80)	53.32	-2.933** (.801)	-1.89 (1.03)		-2.26** (.710)		.476* (.217)	1.514* (.596)		.244** (.090)		-1.608** (.327)	-.068 (.050)	-.074 (.053)					-3.400* (1.49)			2.857* (1.25)	3.28	14.05 (68)	.69
65 and over (X=10.90)	14.30			.159 (.107)					.121** (.033)			-.760** (.160)	-.061** (.020)								-1.294* (.577)		2.04	11.12 (74)	.43

*significant at the .05 level
**significant at the .01 level

Table 12

STEPWISE REGRESSION RESULTS FOR FEMALES IN INTERMEDIATE COUNTIES

Variables-Regression Coefficient (Standard Error) / Labor Force Participation Rates by: AGE	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)		Percent Urban		Population Per Square Mile	Az.-New Mexico (dummy)	NDakota-SDakota (dummy)	Colorado-Utah (dummy)	Wyo-Montana (dummy)	Standard Error	F (d.f.)	R^2
14-15 (Ȳ=12.96)	- 8.50	* 2.343 (.891)		.928 (.373)			** 1.207 (.336)		** .785 (.203)	-.310 (.240)													5.58	8.74 (110)	.28
16-17 (Ȳ=25.43)	-11.18			* 1.128 (.537)			** 1.961 (.519)		** 1.775 (.303)				** -.172 (.045)										8.44	19.35 (111)	.41
18-19 (Ȳ=44.73)	21.04	2.069 (2.11)		* 1.721 (.806)				* 5.726 (2.33)	* 1.139 (.449)				* -.165 (.074)	* -.256 (.106)									11.97	7.34 (109)	.29
20-21 (Ȳ=47.76)	41.93		* -7.37 (2.87)		* 5.36 (2.07)													** .363 (.134)					12.36	7.76 (112)	.17
22-24 (Ȳ=44.96)	23.79		-3.58 (2.11)			* 7.40 (2.95)			** 1.167 (.307)	** 1.000 (.346)								** .327 (.102)			** -8.032 (2.10)	* -4.888 (2.22)	8.52	11.12 (108)	.42
25-34 (Ȳ=38.26)	25.52		* -3.21 (1.23)						** 1.217 (.187)		* .900 (.426)												5.26	20.49 (112)	.35
35-44 (Ȳ=46.03)	10.27			** 1.34 (.380)		* -4.836 (2.07)	** 1.855 (.373)	** 3.696 (1.17)	** .968 (.212)	* .549 (.240)													5.81	13.51 (109)	.43
45-64 (Ȳ=43.00)	- 5.80	** 4.294 (1.15)	2.43 (1.32)	** 1.404 (.317)		* 3.647 (1.42)	** 1.412 (.272)		** 1.182 (.168)	** .930 (.188)	* .780 (.334)	** .744 (.243)	** -.109 (.025)			** .094 (.034)						* -2.126 (1.01)	3.84	19.21 (103)	.69
65 and over (Ȳ=10.33)	4.66		* 1.893 (.757)						** .54 (.111)				** -.043 (.016)								** -2.770 (.718)		3.15	11.41 (111)	.29

*significant at the .05 level
**significant at the .01 level

Table 13

STEPWISE REGRESSION RESULTS FOR FEMALES IN SMALL COUNTIES

Variables-Regression Coefficient (Standard Error) / Labor Force Participation Rates by: AGE	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)				Population Per Square Mile	Az.-New Mexico (dummy)	NDakota-SDakota (dummy)	Colorado-Utah (dummy)	Wyo-Montana (dummy)	Standard Error	F (d.f.)	R^2
14-15 ($\bar{X}$= 10.92)	1.27						* .853 (.427)	* 3.053 (1.371)															7.85	7.95 (120)	.12
16-17 ($\bar{X}$= 21.17)	2.00						** 2.641 (.456)			-.658 (.332)	** 3.118 (1.160)												8.99	14.79 (119)	.27
18-19 ($\bar{X}$= 35.87)	25.59	2.383 (2.373)							** 1.200 (.431)				* -.217 (.101)							** -11.626 (3.213)			15.78	7.10 (118)	.19
20-21 ($\bar{X}$=40.75)	26.34								* .921 (.444)									* .912 (.377)					19.17	5.21 (120)	.08
22-24 ($\bar{X}$=40.98)	2.33	* 3.529 (1.548)					** 1.272 (.638)		** 1.246 (.324)	** 1.630 (.459)													11.51	8.45 (118)	.22
25-34 ($\bar{X}$=34.14)	9.53			.320 (.659)			* 1.025 (.421)		** 1.030 (.188)	** .947 (.310)								* .350 (.170)		* -3.178 (1.479)			7.32	4.57 (116)	.43
35-44 ($\bar{X}$=40.91)	22.67				** 6.302 (2.321)				** .935 (.192)	** .892 (.294)			* -.093 (.046)										8.23	2.11 (118)	.29
45-64 ($\bar{X}$=39.55)	-3.49	** 4.474 (.881)	** 8.582 (2.757)	** 2.555 (.490)			** 1.583 (.313)		** .885 (.162)	** .879 (.227)	** 1.940 (.724)												5.56	17.99 (115)	.52
65 and over ($\bar{X}$=10.94)	5.52								* .507 (.197)				** .134 (.048)										8.50	7.12 (120)	.11

*significant at the .05 level
**significant at the .01 level

Table 14

STEPWISE REGRESSION RESULTS FOR MALES IN LARGE COUNTIES

Labor Force Participation Rates by: AGE \ Variables-Regression Coefficient (Standard Error)	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)		Percent Urban	Percent in Cities of 10,000 or More	Population Per Square Mile	Az.-New Mexico (dummy)	NDakota-SDakota (dummy)	Colorado-Utah (dummy)	Wyo-Montana (dummy)	Standard Error	F (d.f.)	R^2
14-15 ($\bar{X}$=18.72)	13.24	** .342 (.107)	** -.262 (.087)			* .815 (.312)			** .461 (.149)				** -.214 (.047)			* .079 (.036)							4.48	11.59 (73)	.49
16-17 ($\bar{X}$=40.44)	33.21		-.186 (.120)	* .315 (.145)				.353 (.792)	** .625 (.205)				** -.203 (.061)	** -.375 (.088)									6.13	13.75 (73)	.53
18-19 ($\bar{X}$=57.34)	46.44			** .605 (.200)						** -.636 (.197)	** -4.366 (1.37)					** .235 (.060)							9.30	9.91 (75)	.35
20-21 ($\bar{X}$=71.11)	61.34				.809 (.569)					* -.647 (.273)	** -4.92 (1.85)					** .235 (.081)							12.59	5.39 (75)	.22
22-24 ($\bar{X}$=83.46)	76.79				.689 (.397)					* -.414 (.191)	** -3.793 (1.29)					** .153 (.056)							8.79	5.61 (75)	.23
25-34 ($\bar{X}$=93.26)	92.17					** .967 (.294)					* -1.482 (.658)			** -.184 (.063)									4.55	8.38 (76)	.25
35-44 ($\bar{X}$=95.28)	92.47					.342 (.176)				* .132 (.055)			** -.075 (.025)	** -.206 (.036)		.022 (.017)							2.45	13.75 (74)	.48
45-64 ($\bar{X}$=88.10)	81.72			** .210 (.073)					* .220 (.107)	** .297 (.072)			** -.101 (.033)	** -.225 (.048)			.017 (.012)						3.35	11.19 (73)	.48
65 and over ($\bar{X}$=26.69)	17.11	** .403 (.109)				.349 (.313)				** .354 (.099)			** -.138 (.047)			.054 (.035)						** -3.981 (1.42)	4.35	8.41 (73)	.41

*significant at the .05 level
**significant at the .01 level

Table 15

STEPWISE REGRESSION RESULTS FOR MALES IN INTERMEDIATE COUNTIES

Variables-Regression Coefficient (Standard Error) / Labor Force Participation Rates by: AGE	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)		Percent Urban		Population Per Square Mile	Az.-New Mexico (dummy)	NDakota-SDakota (dummy)	Colorado-Utah (dummy)	Wyo-Montana (dummy)	Standard Error	F (d.f.)	R^2
14-15 (X=20.01)	18.27						* .825 (.380)	3.210 (1.57)					** -.155 (.041)	* -.173 (.071)									7.89	7.12 (111)	.20
16-17 (X=37.27)	34.96						** 1.116 (.409)			-.598 (.341)		* -1.107 (.431)	* -.117 (.048)								* 4.246 (2.11)		9.04	8.84 (110)	.29
18-19 (X=57.19)	8.99	* .460 (.175)	** .485 (.156)	** 1.174 (.301)			** 1.459 (.547)		** 3.068 (.800)	-.260 (.506)			* -.175 (.070)					** -.431 (.149)					11.93	8.91 (107)	.40
20-21 (X=75.23)	57.46		* .321 (.151)				** 2.456 (.682)			** -1.875 (.564)												* 7.492 (3.65)	15.87	8.52 (111)	.23
22-24 (X=84.93)	44.63	** .540 (.127)	** .645 (.118)	** .855 (.222)	.531 (.318)	* 1.529 (.675)	* .908 (.447)		** 1.962 (.602)	** -1.091 (.381)								** -.323 (.113)					8.81	13.28 (106)	.53
25-34 (X=92.56)	66.83	** .324 (.062)	** .352 (.059)	* .226 (.103)		* .740 (.363)	** 1.063 (.241)	* 2.571 (.980)		-.283 (.204)													4.79	21.76 (108)	.59
35-44 (X=93.75)	72.72	** .273 (.056)	** .269 (.055)				** .962 (.216)	** 2.806 (.920)	** -.819 (.294)	* .422 (.177)								* .133 (.051)					4.45	15.66 (108)	.50
45-64 (X=86.65)	45.89	** .637 (.054)	** .537 (.050)	** .535 (.096)	** .641 (.139)	* .649 (.297)	** .592 (.195)			** .970 (.174)	* 1.370 (.602)			* -.088 (.037)				.093 (.055)					3.89	28.24 (105)	.73
65 and over (X=28.86)	3.57	** .545 (.082)	** .395 (.070)				** .876 (.266)			** .840 (.234)		** -.931 (.311)											5.99	24.64 (110)	.53

*significant at the .05 level
**significant at the .01 level

Table 16

STEPWISE REGRESSION RESULTS FOR MALES IN INTERMEDIATE COUNTIES

Labor Force Participation Rates by: Age / Variables-Regression Coefficient (Standard Error)	CONSTANT TERM	Agriculture	Construction and Mining	Manufacturing	Transportation & Communication	Wholesale Trade	Retail Trade	Banking, Finance, & Insurance	Services	Government (with public education)	Other Education	Unemployment Rate	Percent Spanish	Percent Indian (by sex)				Population Per Square Mile	Az.-New Mexico (dummy)	NDakota-SDakota (dummy)	Colorado-Utah (dummy)	Wyo-Montana (dummy)	Standard Error	F (d.f.)	R^2
14-15 ($\bar{X}$=18.29)	-10.28	** .464 (.086)	* .401 (.160)	** .999 (.286)			* .832 (.355)																8.87	8.41 (118)	.22
16-17 ($\bar{X}$=32.95)	-32.16	** .714 (.119)	** .794 (.207)	* .952 (.368)			** 1.823 (.484)			** 1.339 (.509)													11.42	12.54 (117)	.35
18-19 ($\bar{X}$=55.92)	-20.52	** .773 (.139)		* 1.096 (.460)	** 2.255 (.767)		** 1.411 (.666)			1.207 (.672)											* 11.453 (4.381)		14.61	13.26 (116)	.41
20-21 ($\bar{X}$=78.52)	64.46	* .302 (.135)			1.517 (.788)									* -.291 (.117)									16.08	6.43 (119)	.14
22-24 ($\bar{X}$=90.36)	66.48	** .408 (.065)			** 1.282 (.347)			2.023 (1.073)		* .847 (.356)				** -.320 (.061)									7.06	20.49 (117)	.47
25-34 ($\bar{X}$=90.05)	81.15	** .220 (.054)	** .291 (.077)	* .313 (.144)			.296 (.200)	.953 (.662)					** -.107 (.029)	** -.123 (.036)									4.06	18.65 (115)	.53
35-44 ($\bar{X}$=94.24)	76.65	** .310 (.059)	** .379 (.087)	** .508 (.161)			* .460 (.217)						** -.114 (.032)	* -.079 (.040)									4.56	20.96 (116)	.52
45-64 ($\bar{X}$= 87.10)	53.62	** .554 (.052)	** .490 (.070)	** .658 (.131)			* .468 (.179)		** .765 (.190)	** .524 (.188)			** -.117 (.026)	** -.169 (.036)									3.61	53.57 (114)	.79
65 and over ($\bar{X}$=31.80)	-20.96	** .715 (.074)	** .609 (.121)	** .616 (.216)		* 1.157 (.561)	* .710 (.303)		** 1.434 (.336)	** 1.214 (.297)													6.62	15.81 (115)	.49

*significant at the .05 level
**significant at the .01 level